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ANNUAL DISTRICT REPORTS

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

INTERIM REPORT

FOREST ENTOMOLOGY AND PATHOLOGY LABORATORY

VICTORIA, B. C.

CANADA

DEPARTMENT OF FORESTRY

FOREST ENTOMOLOGY AND PATHOLOGY BRANCH

April, 1963

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ANNUAL DISTRICT REPORTS

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

R. L. Fiddick

FOREWORD

Changes in the ranger staff in 1962 resulted in B. A. Sugden being re-assigned to take charge of the insectary at Vernon. N. E. Geistlinger was transferred from the insectary to field duties in the East Nelson District. There were several changes in district assignments due to the five year rotation program.

A new ranger headquarters was completed at Powell River for the North Vancouver District. A small fast 20-foot cruiser was obtained for use in the coastal waters of the Prince Rupert District. This unit supplemented with aerial reconnaissance will provide greater flexibility to the survey program in the district.

Cool damp weather persisted for most of the summer, retarding insect development and hampering survey work in some areas.

The infestation of saddle-backed looper, _Ectropis crepuscularia_ Schiff. in the Kitimat area declined in 1962. Despite chemical control operations in 1960 and 1961 some 53,000,000 cubic feet of hemlock and balsam were killed.

Increased spruce bark beetle activity was recorded in the Prince George Forest District with a number of infestations being reported.

Spruce budworm infestations in the Prince George and Prince Rupert forest district subsided and defoliation was apparent on a relatively small area.

Bark beetles of the genus _Dendroctonus_ continued to exact a toll of timber in the interior and on the coast. An attempt was made in 1962 to appraise the amount of white pine killed by the mountain pine beetle on southern Vancouver Island. Additional work will be required in 1963 to complete the appraisal.

Some improvement was noted in the quality and quantity of forest disease collections.

The survey aspects of a study of a _Melampsora_ sp. found infecting ponderosa pine in a forest nursery at Telkwa, B. C. in 1960 was continued in 1962 with the following objectives.

1. To determine if Melampsora rust is able to overwinter in the buds of poplar in the mild coastal regions (see West Prince Rupert Report)

2. Gather Melampsora-infected over-wintered aspen leaves from various parts of the province to determine their infectivity to pine.

3. Determine the occurrence of Melampsora infection in natural pines throughout the province.

4. Assess the distribution of Melampsora rust on aspen throughout the province on the basis of the uredinial stage by assessing infection on 150 leaves from 3 trees every few miles where aspen occurred.

Results

1. No evidence was found to indicate the ability of Melampsora albertensis to overwinter in the buds of poplar.

2. The telial stage of the rust gathered on aspen from various parts of the province produced basidiospores infective to pine in controlled studies.

3. The aecial stage of the rust was not found on naturally occurring pine.

4. The uredinial stage of the rust on aspen was found to occur generally throughout the province but varied greatly in intensity. In general the drier zones, including the ponderosa pine zone, were more lightly infected than the moister sections.

Totals of 3,409 and 4,344 insect collections were submitted to the Victoria and Vernon Insectaries respectively. Forest disease collections totalled 901. Table 1 lists collections for each ranger district.

Map 1 shows the areas surveyed from the air. Most flights were for a specific purpose such as damage appraisal surveys or mapping defoliator outbreaks.

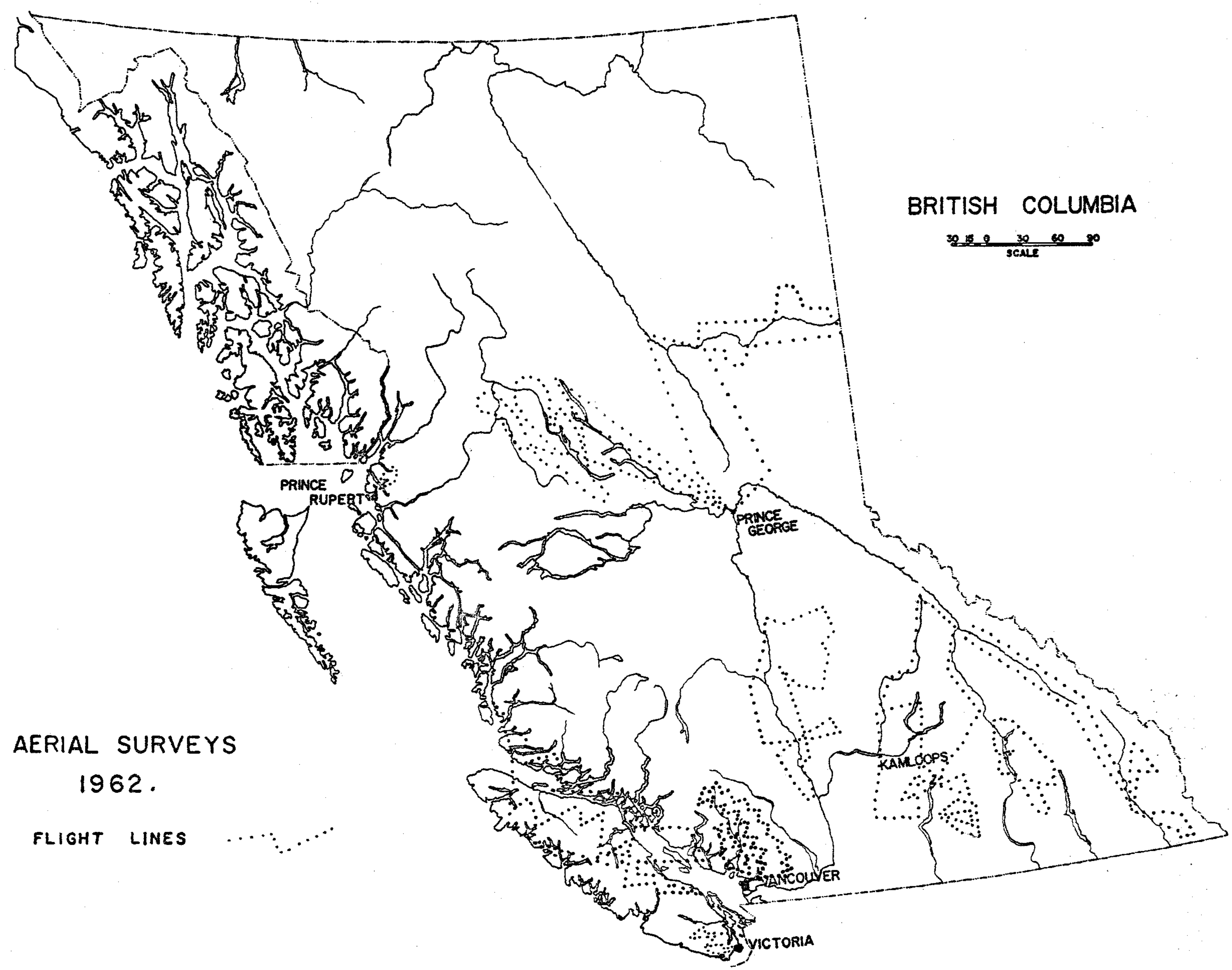
Table 1

Forest Insect and Forest Disease Collections
by Agencies

British Columbia and Yukon - 1962

Personnel involved		South Vancouver Island	North Vancouver Island	South Vancouver	North Vancouver	South Prince Rupert	West Prince Rupert	East Prince Rupert	East Kamloops	Central Kamloops	West Kamloops	West Nelson	Central Nelson	East Nelson	South Prince George	West Prince George	North Prince George	Yukon
Forest Biology Rangers Independently	Forest Insect	382	320	356	402	150	374	297	307	362	463	382	339	340	359	355	337	453
	Forest Disease	38	19	37	87	5	62	77	52	49	21	52	48	47	53	45	17	192
Forest Biology Rangers with Forest Service Personnel							3				2		8	9	7	2		
Forest Service Personnel Independently		51	17	27	53	4	5	16	8	10	3			2	1	2	5	1
Other Co-operators		557*	15	12	10	6	42	4	7		1		1			1		1
Totals		1,028	352	432	552	165	486	394	374	421	490	434	396	398	420	405	359	647

* Includes collections from light trap at Langford.


BRITISH COLUMBIA
30 15 0 30 60 90
SCALE
PRINCE RUPERT
PRINCE GEORGE
KAMLOOPS
VANCOUVER
VICTORIA
AERIAL SURVEYS
1962.
FLIGHT LINES

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

VANCOUVER FOREST DISTRICT

VANCOUVER ISLAND SECTION

FOREST INSECT AND DISEASE SURVEY

VANCOUVER FOREST DISTRICT

VANCOUVER ISLAND SECTION

1962

D. G. Collis

INTRODUCTION

Personnel responsible for the survey of Vancouver Island remained unchanged in 1962, with D. G. Collis in the southern portion and N. E. Alexander in charge of the North Vancouver Island District.

Generally, forest defoliators were conspicuous by their absence. Hemlock sawflies caused considerable defoliation in two small widely separated areas. Webs created by the silver-spotted tiger moth were much more numerous in 1962 than in 1961. Tent caterpillar infestations were more numerous, especially on southern Vancouver Island. Oak looper larvae defoliated oaks on Christmas Hill again this season but the feeding was much lighter than in 1961.

The mountain pine beetle continued to cause mortality in western white pine. Appraisal surveys to determine losses were initiated in 1962.

Fir engraver beetles again caused considerable mortality to grand fir trees.

FOREST INSECT AND DISEASE SURVEY

SOUTH VANCOUVER ISLAND DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

SOUTH VANCOUVER ISLAND DISTRICT

1962

D. G. Collis

INTRODUCTION

Active field work commenced in April and was not completed until early December. Of this period, regular field sampling occupied from late May until the end of August. Half of July was spent assisting with the South Prince Rupert Survey. The remainder of the field season was devoted to plot work, building construction and bark beetle cruises. Table 1 lists all the collections made in the South Vancouver Island District by hosts, of which 382 were made by the writer. The remaining 608 samples were made by numerous co-operators, department personnel and the Langford Insectary staff. Forest disease samples totalled 38. The distribution of collection points is shown on Map 1.

Table 1

Collections by Hosts

South Vancouver Island District - 1962.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, Lebanon	1		Apple	4	
Cedar, Port Orford	1		Arbutus	6	2
Cedar, western red	31		Aspen, trembling	7	1
Cedar, yellow	1		Alder, red	15	2
Douglas-fir	192	6	Birch	4	
Fir, amabilis	25	2	Cascara		1
Fir, grand	22	2	Cherry	3	
Hemlock, mountain	2		Dogwood, western		
Hemlock, western	126	9	flowering	5	
Larch, European	2	2	Elm	1	
Pine, spp.	6		Hawthorn	2	
Pine, jack		1	Holly	2	
Pine, lodgepole	9	2	Maple, broadleaf	10	1
Pine, Monterey		2	Maple, vine	1	
Pine, ponderosa	1		Oak, Garry	92	1
Pine, red		1	Plum	1	
Pine, Scots	1	1	Willow	32	1
Pine, shore	5		No host	279	
Pine, western white	11	1	Miscellaneous hosts	76	
Spruce, Sitka	14				
			Total	540	9
Total	450	29	GRAND TOTAL	990	38

STATUS OF INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

White pine trees have been dying over portions of coastal British Columbia for many years at a rate far in excess of natural mortality. The causal agent was at first believed to be white pine blister rust. However, it has been realized for a number of years that usually only the smaller diameter trees were killed by the disease, and that the majority were being killed by the mountain pine beetle.

In June of 1962, about five hours of aerial surveys over the southern end of Vancouver Island showed that a large portion of the white pine trees were dead. The area was too large and the dead trees too numerous to permit appraisal from the air, so it was decided that volume losses could only be obtained by ground surveys. No specific details are given in this report because the appraisal of dead pine is only partially completed for the South Vancouver Island District.

Six strips were run on Vancouver Island south of the Shawnigan Lake-Port Renfrew road in the fall of 1962. These strips totalled 77 acres in area and varied in length from one to three miles. The strip locations were as representative as possible, considering elevation and the varying timber types encountered, from the exposed west coast hemlock-cedar to the Douglas-fir stands in the Sooke Lake watershed.

Difficulty has been encountered in arriving at an area figure for the remaining mature timber on this portion of the Island, so the total volumes of pine given here should be considered as a preliminary estimate only. All dead standing white pine were included in the total if bark was still on the snag and they were judged to have been killed by beetles or blister rust. On this basis, up to the end of 1962, a total of 113,799,000 cubic feet of white pine has been killed and only 16,768,000 cubic feet of green standing pine remained. Of the total mortality, only .53 per cent appeared to have been caused by white pine blister rust, Cronartium ribicola J. C. Fisch. involving trees from four to ten inches in diameter. Trees of all diameters up to 50 inches D. B. H. were beetle killed. The majority of the mortality occurred prior to 1960. Mortality can be expected to continue because green attacked trees were found on the strips and red top pines are not uncommon in this area.

Green-striped Forest Looper, Melanolophia imitata Wlk.

The number of these larvae found per collection reached an all time low in 1962 for years when a comprehensive survey of all drainages has been accomplished. This drop in larval numbers is clearly shown in Table 2.

Table 2

Summary of Green-striped Forest Looper found by Drainage Divisions, South Vancouver Island District.

Drainage division	Total no. collections taken during larval period			Per cent of collections containing larvae			Average no. larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
001	7	17	6	28.6	5.8	0	1.0	1.0	0
002	92	57	113	14.1	14.0	0	4.4	2.7	0
003	46	39	54	30.5	84.6	5.5	13.8	4.7	1.0
004	29	6	28	13.8	0	0	1.5	-	-
005	69	68	59	84.6	67.6	3.4	58.1	11.1	1.0
Total	243	187	260	37.4	47.0	1.9	39.9	7.8	1.0

Stand damage

Two plots were established in the fall of 1960 in Block 493, near Ahousat, to record stand damage from looper feeding. To date, no mortality has occurred as a result of the defoliation, and the majority of the trees now look almost normal. In the two plots, nine per cent of the trees still show short top kill, usually less than six feet. Some mortality occurred on Obstruction Island, and is undoubtedly the result of looper feeding. This is the only complete tree kill so far recorded due to defoliation in 1960 from this looper in the South Vancouver Island District.

Hemlock Sawfly, Neodiprion spp.

These tenthredinid larvae were found in very small numbers until August 14, when a survey was made of the Drinkwater Creek Valley at the west end of Great Central Lake. Defoliation was observed for about three miles along the upper creek valley and was quite visible on both hemlock and balsam overstory, some of which had lost 15 per cent of their foliage, and mid-story trees up to 20 per cent. Defoliation varied between trees and within single crowns but averaged 15 per cent. Six hundred and fifty larvae were collected from three hemlock trees and 200 from three balsam. This area was inspected from the air at the end of August and no defoliation or discolouring of foliage was visible.

Collections containing large numbers of Neodiprion larvae do not necessarily mean that visible defoliation will occur. The larvae are colonial feeders so that the number of larvae in beating collections may vary from branch to branch and tree to tree. It is not unusual to collect 600 or more larvae per three-tree beating sample in a stand where there is no or little noticeable defoliation.

Oak Looper, Lambdina somniaria (Hulst)

The oak looper infestation in the Christmas Hill region of Saanich persisted in 1962. Oak trees were 50 per cent defoliated in 1959, feeding increased in 1960 and reached almost 100 per cent in 1961. In 1962, only about 20 per cent of the oak leaves were consumed although larvae were still plentiful. Of a group of 20 larvae reared at the insectary, five died of unknown causes, one by parasites, three died as pupae and the remaining 11 emerged as adults. In the field, adults were observed flying until the beginning of October.

Egg counts have been made in the late fall since 1960. The method used was to remove 1/2 square foot of moss from the trunk of three trees selected at random, from two locations on Christmas Hill, and count the eggs in the moss. The information gained from this sampling is listed in Table 3. As the 1961 egg figures suggested, the larval population was much lower in 1962 than it was in 1961. However, the number of eggs found in 1962 increased more than four-fold compared with the previous years' count. Even so it is doubtful if a very large larval population will exist in 1963 as a virus disease is prevalent within the population.

Damage to the oak trees from this infestation is apparently negligible, but Douglas-fir and grand fir within the oak stand have been heavily damaged, and tree mortality as well as top and branch kill has resulted.

Table 3

Number of Oak Looper Eggs from Six Oak Trees on Christmas Hill.

South Vancouver Island District.

Locality	Eggs found per half sq. ft. of moss		
	1960	1961	1962
Near Quadra Street	270	17	30
	520	40	287
	733	5	82
Near Rogers Avenue	26	12	9
	15	17	3
	19	3	17
Total	1,583	94	428
Av. no. eggs per sample	263.8	15.6	71.3

Silver-spotted Tiger Moth, Halisidota argentata Pack.

The number of webs recorded in the spring of 1962 more than doubled compared with 1961. The preferred host of this insect is Douglas-fir, although webs are also found on all the common coniferous species. No serious defoliation resulted from this relatively large population. Table 4 shows a comparison of web counts over various sections of road for 1960, 1961, and 1962.

Table 4

Roadside Web Counts of Silver-spotted Tiger Moth Colonies

South Vancouver Island District.

Area surveyed	Total no. webs recorded			Average number webs per mile	
	1960	1961	1962	1961	1962
Victoria to Duncan	57	704	1,592	22.0	49.0
Duncan to Nanaimo	84	391	743	11.8	23.4
Nanaimo to Parksville	86	334	940	14.5	40.3
Parksville to Cameron Lake	34	173	416	9.0	28.5
Duncan to Lake Cowichan	33	84	181	4.7	10.4
Lake Cowichan to Youbou	83	191	170	21.1	17.7
Total	377	1,877	4,042	14.5	31.3

Pine Butterfly, Neophasia menapia Feld.

Phenomenal adult flights of this insect occurred in 1959 and 1960 on Vancouver Island. A small control project was undertaken in Cathedral Grove in 1961. No larvae were collected during the 1962 survey season, and adults were rarely seen in the woods. A few butterflies were observed in a small grove of Douglas-fir trees on the Department of Forestry Laboratory site in Saanich.

Douglas-fir Terminal Damage

Leader damage to Douglas-fir regeneration was negligible in April, 1962, when four previously established plots were examined. A comparison of tree conditions recorded at a comparable date in 1961 is given in Table 5. The majority of damage recorded in 1962 was of the type where only the leader tip was missing. The causal agent is not known but more than one factor is believed involved.

Table 5

Number of Douglas-fir Terminals Killed or Damaged by Various Causes.

South Vancouver Island District.

Plot no.	Locality	No. trees	Leaders killed or damaged 1961	1962
1	Bear Creek	94	46	6
2	Nitinat River	67	24	3
3	Shaw Creek	83	30	6
4	Above Bear Creek Camp	48	9	0
	Total	292	109	15
	Per cent		37.3	5.1

Fall Webworm, Hyphantria cunea Drury

Webs created by this insect were again very common on the eastern side of the South Vancouver Island District except for the portion south of Mill Bay where none were observed. Some deciduous trees, mainly alder and wild cherry, were again completely defoliated although web counts decreased from 1961. The numbers of webs counted over a mile of road just south of Ladysmith were 83 in 1960, 167 in 1961, and 127 in 1962.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Populations of the western hemlock looper decreased in 1962. Of the 253 field samples made during the larval period 2.4 per cent contained an average of 1.4 hemlock looper larvae per collection. In 1961, 10.3 per cent of 164 collections contained the species and averaged 1.7 larvae per positive sample.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Two spruce budworm larvae were found in two collections in 1962. A similar number was found in 1961.

Black-headed Budworm, <u>Acleris variana</u> (Fern.)

Since the last outbreak of black-headed budworm subsided on Vancouver Island in 1958, this insect has been very scarce in collections. This year, no larvae were found. The average number of larvae per sample from 1958 to 1962 was 2.1, 1.8, 1.8, 1.0, 0.

Tent Caterpillars, <u>Malacosoma</u> spp.

The small infestation in Port Alberni continued, but defoliation was lighter and over a smaller area than in 1961. On the southern end of Vancouver Island, the frequency with which tents were observed increased greatly over 1961 and should increase again in 1963.

Satin Moth, <u>Stilpnotia salicis</u> (L.)

Several European white and Lombardy poplar trees were again severely defoliated in the Greater Victoria area.

A Plantation Weevil, <u>Steremnius carinatus</u> Boh. (formerly <u>Paraplinthus carinatus</u> Boh.)

Damage to seedlings by this weevil was first reported in 1961. In 1962 <u>S. carinatus</u> became a serious pest of plantations and natural regeneration throughout portions of coastal British Columbia. The most serious damage on Vancouver Island occurred at Nitinat Lake where 60 per cent of Douglas fir seedlings planted in the fall of 1961 were attacked. Spruce and hemlock seedlings are also attacked.

More specific surveys and detailed studies are being carried out by Research Officers on a project basis. The results of their work will be published as separate reports and publications.

Zimmerman Pine Moth, <u>Dioryctria zimmermani</u> (Grote)

Deformed candles on exotic pine trees caused by larval mines were discovered in mid April on Vancouver Island's west coast. At that date the insects had formed pupal chambers at the base of the candles among the needles. Most of these chambers were empty when examined, but enough living pupae were located that adults were obtained and identification was possible. The feeding did not necessarily kill the candle, but if not, the growth was stunted and the trees deformed to some extent. Table 6 shows the hosts and the percentage of trees on which mined candles were found.

Table 6

Percentage of Trees with Candles Mined by Dioryctria zimmermani (Grote)

South Vancouver Island District, 1962.

Location	Host	Per cent trees attacked
Kennedy River	Pinus muricata	60
	Pinus radiata	75
	Pinus pinaster	0
S. end Kennedy Lake	Pinus muricata	50
	Pinus radiata	30
	Pinus pinaster	0
Draw Creek Kennedy Lake	Pinus muricata	6
	Pinus radiata	0
	Pinus pinaster	4

An aphid on Abies spp. probably Mindarus abietinus Koch.

Damage to the current needles of both grand and amabilis fir trees was evident over the whole South Vancouver Island District during 1962. Feeding was heaviest on the lower branches and at times was sufficient to stunt twig growth, and deform and discolour needles.

The Fir Engraver Beetle, Scolytus ventralis Lec.

Grand fir mortality continued wherever the host tree was present within the district. Trees which had suffered some disturbance to root structure, or where natural drainage was disturbed appeared to be most susceptible to attack, but trees in undisturbed stands were also heavily attacked and killed. Larger trees are usually top killed a year or two in advance of complete mortality.

OTHER NOTEWORTHY INSECTS

Species	Host	Number of collections	Remarks
Altica tombacina Mann.	fireweed	1	Completely defoliated fireweed near Port Renfrew.
Epirrita autumnata Harr.	H, C, Bg	4	Twenty-eight larvae found, all on Gulf Islands.

OTHER NOTEWORTHY INSECTS - continued

Species	Host	Number of collections	Remarks
Malacosoma pluviale Dyar	European larch	1	Colony appeared to be well established on this host.
Neoalcis californiaria Pack.	H, S, F, C, Bg, Mb	23	Twenty-eight larvae found, moth flight observed on August 7 near Port Renfrew.
Zeiraphera spp.	S	4	Over 50 per cent of the buds mined near Port Renfrew and Clo-oose.

STATUS OF FOREST DISEASES

Important Diseases

An Outbreak of the Sweet Fern Blister Rust on Exotic Pines.

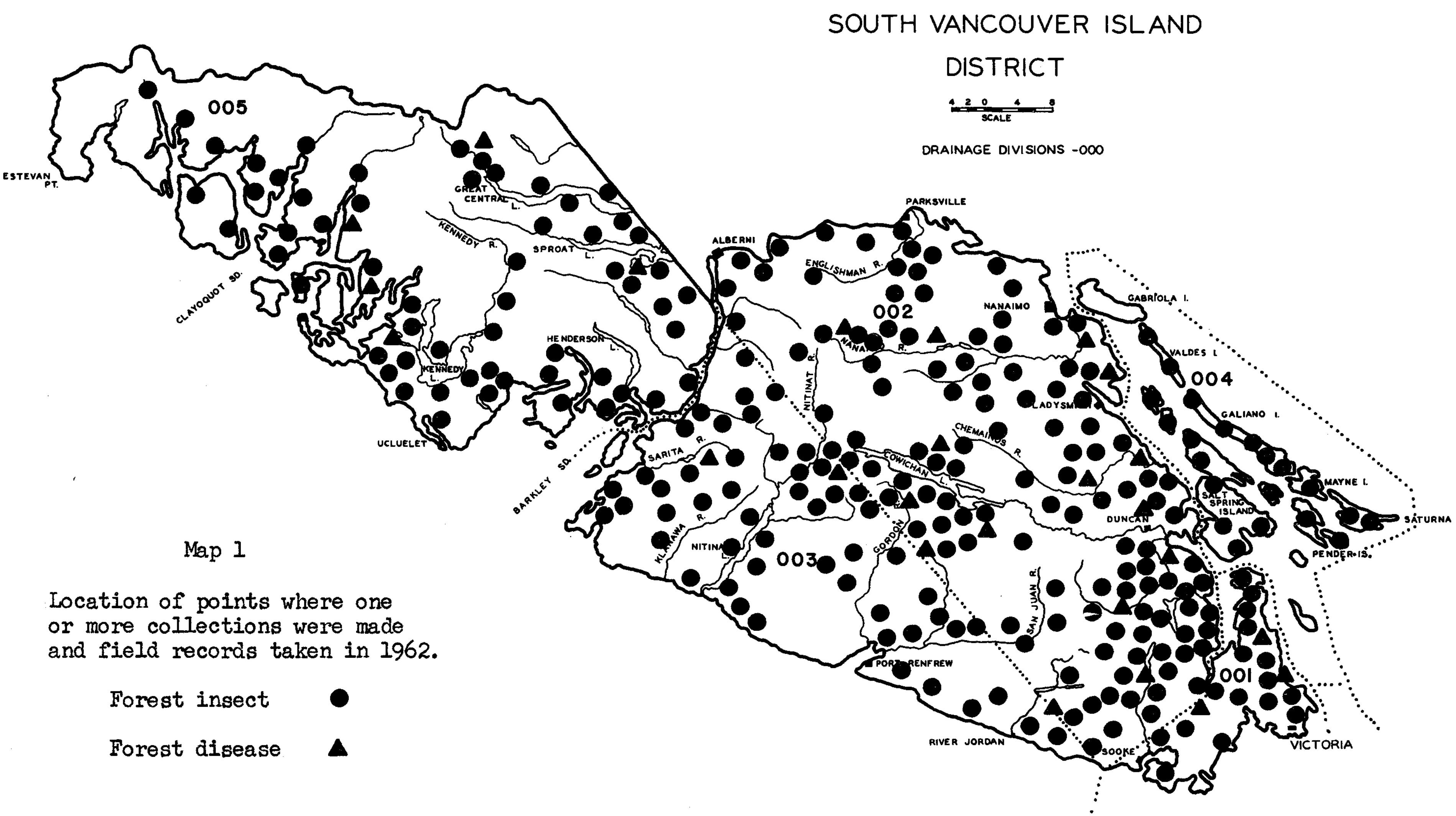
A severe outbreak of the sweet fern blister rust (Cronartium comptoniae Arth.) on Monterey pine (Pinus radiata D. Don) and Bishop pine (Pinus muricata D. Don) was discovered in exotic pine plantations on Vancouver Island in 1961. In a re-check of the plantations during 1962, the disease was found on cluster pine (Pinus pinaster Ait.) as well, but thus far it was restricted to the Kennedy Lake area. Of 150 cluster pine examined there in three plantations, aecial pustules were found on only four trees, but another 31 trees showed symptoms of the disease. Thus far mortality has occurred only in Monterey pine plantations and reached 30 per cent at one location. In others, Monterey and Bishop pines were in very poor condition.

Snow Damage.

A heavy wet snow during the early spring of 1962 caused considerable scattered breakage to regeneration and pole-sized stands over much of the lower elevations on the east side of the district. Trees varied in size from two to six inches at the break and the tops usually lay in an easterly direction. Areas where the damage was noted included the Nanaimo, Chemainus, Cowichan and WildDeer valleys plus the Parksville - Alberni highway.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Alder, red	*Valsa* sp.	Victoria	New host record. Causes a bark canker, usually associated with weakened trees.
Cascara	*Tubercularia vulgaris* Tode ex Fr.	Victoria	New host record. Causing die-back.
Douglas-fir	*Leocarpus fragilis* (Dicks.) Rostrup	Alberni	A new host record. A slime mold, probably saprophitic.
Fir, grand	*Pleurotus* sp.	Duncan	A new host record. A decay fungus usually occurring on hardwoods.
Larch, European	*Sclerophoma* sp.	Cowichan Lake	A new host record. Usually associated with stains.
Maple, broadleaf	*Melanconium* sp.	Duncan	A new host record. Associated with a die-back.
Pine, Bishop	*Armillaria mellea* (Fr.) Kummer	Ucluelet	A new host record. Common on hosts of low vigor and in stands growing in unnatural conditions.



Map 1

Location of points where one
or more collections were made
and field records taken in 1962.

Forest insect ●

Forest disease ▲

FOREST INSECT AND DISEASE SURVEY

NORTH VANCOUVER ISLAND DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

NORTH VANCOUVER ISLAND DISTRICT

1962

N. E. Alexander

INTRODUCTION

The Forest Insect and Disease Survey within this district commenced on April 10 and was completed on November 2. A total of 352 forest insect and 19 forest disease collections was made during this period. Table 1 lists collections by hosts and Map 1 shows the district and drainage boundaries and the locations of points where collections were made.

There were only three areas of noticeable insect feeding this year. Aphids were abundant in the area bounded by Coal Harbour, Port Hardy and Port McNeill. The hemlock sawfly, Neodiprion sp., caused some defoliation to a small area near Haihte Lake (D. D. 024). The fall webworm, Hyphantria cunea Harr., was very numerous on assorted deciduous hosts in D. D. 021 and parts of 022.

Access problems severely limited the survey in Drainage Division 023.

Table 1

Collections by Hosts

North Vancouver Island District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, red	13	-	Alder, red	3	-
Douglas-fir	74	1	Alder, Sitka	1	-
Fir, amabilis	24	1	Apple	1	-
Fir, grand	6	-	Ash	1	-
Hemlock, mountain	1	-	Aspen, trembling	3	2
Hemlock, western	158	4	Dogwood	2	-
Pine, lodgepole	10	-	Maple, broadleaf	1	-
Pine, cluster	-	1	Maple, sp.	2	-
Pine, Monterey	-	4	Poplar, European white	1	-
Pine, ponderosa	1	-	Oak, Garry	2	-
Pine, red	-	1	Willow	3	1
Pine, Scots	-	2	No host	4	-
Pine, white	6	1	Miscellaneous	8	1
Spruce, Norway	1	-			
Spruce, Sitka	26	-			
			Total	32	4
Total	320	15	GRAND TOTAL	352	19

STATUS OF INSECTS

Green-striped Forest Looper, <u>Melanolophia imitata</u> Wlk.

No larvae of the green-striped forest looper were collected on North Vancouver Island in 1962. Only four larvae were collected on all of Vancouver Island, of which two were on the west coast (D. D. 005). A summary of collections containing this species is shown in Table 2.

Table 2

Summary of Green-striped Forest Looper Collections by Drainage Division, North Vancouver Island.

Drainage division	Total number of samples taken during larval period			Per cent of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
021	92	39	72	38.0	2.6	0	3.7	1.0	-
022	63	23	48	38.1	8.7	0	3.2	1.0	-
023*	48	40	8	0	82.5	0	-	6.7	-
024	44	11	24	47.7	9.1	0	4.3	1.0	-
025	88	53	60	69.3	24.5	0	10.1	1.4	-
026	6	3	4	83.3	0	0	2.8	-	-
Total	341	169	216	46.0	21.2	0	6.3	4.9	-

* D. D. 023 sampled too early for best results on this species in 1960.

Mortality plots established in the recent infestation were examined again in 1962 and the mortality figures brought up to date. Trees continued to die in 1962 and these plots will be re-examined annually until the remaining trees recover. Table 3 shows the number of trees which have died each year in each plot and the resultant volume losses.

The heavy tree and volume losses indicated on the Villaverde Island plot for 1962 probably occurred in 1961.

Only five of the 46 trees which died were less than 90 per cent defoliated in 1960 (Table 4). This indicates that recovery of trees less than 90 per cent defoliated is relatively high.

Table 3

Tree Mortality Resulting from Green-striped Forest Looper Defoliation in 1960.

D. D. 023, North Vancouver Island.

Area	No. trees	Number of trees dead			Volume loss (cu. ft.)		
		1961	1962	Total	1961	1962	Total
Eelstow Passage	100	5	3	8	55.9	38.7	94.6
Port Eliza	100	3	7	10	168.6	394.3	562.9
Villaverde Island	44	-	36	36	-	664.3	664.3
McKay Cove *	50	0	1	1	0	22.9	22.9

* Plot destroyed, relocated in 1961.

It is also of interest to note that of the 43 trees classes as completely defoliated five were still living in 1962. This indicates remarkable recovery of trees which were severely defoliated.

There is little doubt that hemlock was the preferred host and suffered the most damage (Table 5).

Volume losses have not been calculated. When tree mortality ceases in the plots, strip cruises will be made in representative areas, and the total volume losses will be compiled.

Table 4

Tree Losses Tabulated by Crown Class and Defoliation .

Green-striped Forest Looper, North Vancouver Island.

Crown class	Per cent defoliation in 1960	Number of trees	Number of trees dead 1961	Number of trees dead 1962
Dominant and Co-dominant	100	20	2	16
	90- 99	7	1	5
	80- 89	8	0	0
	70- 79	5	0	0
	50- 69	32	1	1
	<49	54	0	0
	Total	126	4	22
Intermediate and Suppressed	100	23	2	18
	90- 99	14	2	3
	80- 89	11	0	1
	70- 79	6	0	1
	50- 69	18	0	1
	<49	56	0	0
	Total	128	4	24

Table 5

Ocular Estimate of Percentage Defoliation Caused by Green-striped Forest Looper in 1960 and Resultant Mortality to 1962. Trees Arranged by Crown Classes. North Vancouver Island - D.D. 023.

Locality	Host	Number of trees	Average per cent defoliation (1960)				Tree mortality to 1962			
			Dom.	CoD.	Int.	Supp.	Dom.	CoD.	Int.	Supp.
Eelstow Passage	Hemlock	105	38	51	57	38	0	2	4	2
	Cedar	3	-	-	24	-	-	-	0	-
	Amabilis fir	2	-	-	35	10	-	-	0	0
Port Eliza	Hemlock	91	50	69	57	44	2	5	3	0
	Douglas-fir	2	trace	23	-	-	0	0	-	-
	Cedar	5	15	-	23	90	0	-	0	0
	Amabilis fir	2	-	77	-	90	-	0	-	0
Villaverde Island	Hemlock	38	38	99	99	100	5	11	11	4
	Cedar	2	-	-	87	100	-	-	0	1
	Douglas-fir	4	-	100	100	100	-	1	2	1
McKay Cove 1/	Hemlock	49	-	-	-	-	0	0	1	0
	Spruce, Sitka	1	-	-	-	0	0	-	-	-

1/ Original plot logged - re-established 1961.

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

The hemlock looper population remained at a low level throughout the district in 1962. Of the 227 collections made during the larval period 1.0 per cent contained an average of 2.3 larvae each (Table 6). As in 1961, larvae were more numerous in D. D. 025 than in the other drainages, but the occurrence was very low with only 8.0 per cent of the collections containing larvae of this species. No larvae were found at Port Eliza (D. D. 023) where a moth flight occurred in 1961, but this area was sampled late in the season and some insects could have been missed.

Table 6

Summary of Hemlock Looper Collections by Drainage Division,

North Vancouver Island.

Drainage division	Total number of samples taken during larval period			Per cent of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
021	68	27	83	2.9	18.5	1.0	1.0	2.0	3.5
022	70	23	48	2.9	0	0	2.3	-	-
023	49	40	8	0	37.5	1.0	-	4.0	3.5
024	48	11	27	10.4	0	0	1.0	-	-
025	95	53	58	12.6	7.5	8.0	6.7	4.0	1.9
026	6	3	3	0	0	0	-	-	-
Total	336	157	227	6.1	15.3	1.0	4.4	2.7	2.3

Neodiprion spp., Sawflies from Hemlock

The percentage of collections containing sawflies from hemlock remained constant, but the average number of larvae per collection increased in 1962 (Table 7).

A small infestation, less than 10 square miles in extent, occurred at Haihte Lake in D. D. 024, southwest of Kelsey Bay. The trees affected were hemlock reproduction within the old black-headed budworm kill of 1944. A three-tree beating sample made in the immediate location of the infestation in July contained only 150 larvae. This was an exceptionally low number to later be associated with discernible feeding. Collections made in the adjacent Kelsey Bay, Sayward, and Salmon River areas did not exceed nine larvae.

Two plots were established in early November within the defoliated areas. The one by one chain plots contained 57 and 100 trees in Plots A and B respectively. Defoliation estimates made in the two plots averaged 26 and 30 per cent for hemlock, and five and twelve per cent for amabilis fir (Table 8). Defoliation of individual trees varied greatly, ranging from five to 64 per cent. The larvae are colonial and economical feeders during most of their development, but, as colonies are scattered, the feeding is not uniform. This species has a definite preference for foliage a year or more in age and this results in heavier feeding on the inner areas of the branch and in the lower crown levels where this age class of needle predominates.

Three trees were selected at each plot for egg and cocoon sampling. For each tree the crown was visually divided into top, mid, and lower thirds, designated A, B, and C, respectively. Three branches were selected from the mid-portion of each crown level, one each from the south, northwest, and northeast side of each tree. The foliage area of each branch was calculated and the branches were examined for eggs and cocoons.

Twelve one-foot-square duff samples from beneath each tree were examined for cocoons. These were taken from the north, south, east and west sides of the trees at three positions; 1) against the base of the tree, 2) at the periphery of the crown projection, and 3) midway between 1 and 2. Ground cover plants under the trees were also examined for cocoons.

The average number of eggs per square foot of foliage surface ranged from nil to 2.2 for the individual trees sampled (Table 9). The number of eggs per square foot were too low for comparison between crown levels and direction. The number of eggs found on indiviudal branches ranged from one to a maximum of 59.

The average number of cocoons per square foot of foliage surface for all trees sampled was 0.8 (Table 10). The data for plots A and B were grouped. The largest number of cocoons were found in crown level B and on the northwest branches.

A total of 192 cocoons or 2.7 per square foot were found in the duff samples (Table 11). The largest number of cocoons were found on the south side of the trees against the base of the trees.

It is impossible to predict population trends based on the egg and cocoon data. If the outbreak continues an effort will be made to relate defoliation in 1963 with the number of cocoons found in 1962.

Table 7

Summary of Neodiprion spp. Sawfly Collections by Drainage Division,

North Vancouver Island.

Drainage division	Total number of samples taken during larval period			Per cent of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
021	135	84	95	17	11	10	16.0	3.4	2.9
022	72	46	64	18	23	15	2.0	2.9	2.1
023	51	57	9	7	22	44	2.0	5.0	4.2
024	46	24	25	34	25	12	4.7	4.2	50.6
025	88	66	54	32	31	50	3.8	14.8	22.1
026	6	4	7	0	25	57	0	2.0	1.2
Total	398	281	254	21	22	22	6.6	7.5	14.3

Table 8

Ocular Estimate of Defoliation by Neodiprion Sawflies of Hemlock and

Amabilis Fir Regeneration, Haihte Lake, D. D. 024.

North Vancouver Island, 1962.

Plot	Species	No. of trees	Defoliation (per cent)
A	H	80	30
	B	20	12
B	H	50	26
	B	7	5

Table 9

Individual Tree Defoliation and Egg Counts, Neodiprion spp., Haihte Lake.

North Vancouver Island, 1962.

Plot	Tree number	Square feet of foliage	Per cent defoliation	No. of eggs	No. of eggs per sq. ft.
A	801	120.7	23.5	116	0.96
	839	67.0	38.0	5	0.07
	841	18.6	64.2	0	0
B	902	62.6	58.0	32	0.51
	934	25.4	56.4	55	2.16
	948	25.0	30.2	20	0.80

Table 10

Average Number of Neodiprion Cocoons per Square Foot of Foliage Surface by Crown Level and Direction. Figures are Averages of Trees in Plots A and B.

North Vancouver Island - 1962.

Crown level	Direction			Average
	S	NE	NW	
A	0.6	0.6	0.5	0.6
B	1.0	1.4	3.5	1.9
C	0.5	0.8	1.0	0.7
Average	0.7	0.9	1.6	0.8

Table 11

Average Number of Neodiprion Cocoons per Square Foot of Duff.

Haihte Lake, North Vancouver Island - 1962.

Sample Point No.	Direction N	E	S	W	Average
1	2.0	3.5	4.5	3.5	3.4
2	2.5	4.5	2.5	1.3	2.7
3	1.2	4.2	1.7	0.7	1.9
Average	1.9	4.1	2.9	1.8	2.66

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopk.

The Douglas-fir beetle has been active in the upper Oyster River Valley for some years. The attack pattern consists of individual and scattered patches of trees. There are no large areas of heavy mortality. Somewhat increasing the apparent intensity of the Douglas-fir kill is the presence of many dead and dying white pine.

There is also considerable Douglas-fir mortality on the slopes adjacent to Buttle Lake but it has not been definitely established that this is beetle kill.

Aerial observations made during 1962 show that the two areas can be considered as separate infestations, both being confined to their respective valleys.

On May 28, 1962, an experiment was set up in the Oyster River infestation in an attempt to induce beetle attack and record the colour changes in the attacked trees. This type of experiment has been successful in the interior of the province but had not been attempted on the coast.

Beetles were collected and sexed in early May and the female beetles caged on the five experimental trees in aluminum screen cages. Four 4 x 5 inch cages were nailed flush to the bark at breast height on each tree. Five female beetles were placed in each cage and the cage sealed. Twelve other fir trees and three white pine were numbered as check trees.

On June 7 the trees were checked and the caged beetles were dead. They had not made any apparent attempt to enter the trees. There was no sign of other attack.

The area was visited again on August 9 and this time there was attack on four of the five caged trees. The only tree not attacked, number one, was a partially exposed fringe tree. The attacks were all in the lower bole of the tree and are not believed numerous enough to kill the trees.

It is not considered likely that the dead female beetles set up an attractant. Possibly some of the beetles were still alive at the June 7 examination and evidence of their boring within the cages had been erased by August 9. At any rate, the caged trees were the only ones attacked in the plot and in the immediate vicinity.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Numerous dead and dying white pine trees were observed in the Oyster River Valley. A considerable amount of white pine mortality is also present on the slopes adjacent to Buttle Lake. The mountain pine beetle has been active in the North Vancouver Island District for many years, but no attempt has been made to date to appraise volume losses.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

The silver-spotted tiger moth population increased again in 1962. During the annual spring web count a total of 3,466 webs was recorded from Parksville north to Campbell River. In 1961 there were 441 webs recorded in the same strip.

There were no areas where the principal host, Douglas-fir, was severely damaged. Feeding was limited to occasional branches and terminals.

Web counts and averages per mile are as follows:

Year	Average number of webs per mile	Total number of webs recorded
1960	1.2	97
1961	5.6	441
1962	37.4	3,466

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm population remained at an extremely low level in 1962. Only one collection in D. D. 025 contained a probable Acleris larva.

Fall Webworm, Hyphantria cunea Drury

The fall webworm population increased again in 1962 to an even higher level than in previous years. Web counts made north of Courtenay in 1960, 1961, and 1962 totalled respectively 42,262 and 333 webs per mile. There was less defoliation in 1962 than in 1961 and the webs were smaller. As in previous years the insect occurred on a wide variety of deciduous hosts.

OTHER NOTEWORTHY INSECTS

North Vancouver Island District - 1962.

Insect	Host	No. of collections	Remarks
Caripeta divisata (Wlk.)	F, H, B	15	Aug. 15 - Sept. 6. Av. 1.7 larvae per collection. Widely distributed.
Cheilosia alaskensis Hunt.	H	1	Miracle Beach Park. 1/10 acre plot. 51% of stems infested.
Choristoneura fumiferana Clem.	H, F, C,	3	Continuing low population. Three larvae in three collections compared to four in four (1961) and two in 1960.
Ectropis crepuscularia Schiff.	H	1	One larva, Dahlstrom Point, July 19.
Epirrita pulchraria (Tayl.)	H, F	5	June 6 - July 23. Wide occurrence.
Gabriola dyari Tayl.	H, F	5	June 4 - Aug. 9. Av. 1.8 larvae per collection.
Malacosoma pluviale (Dyar)	Apple	1	Species common but not at high level. Many colonies infected with a Polyhedrosos virus.
Neoalcis californiaria Pack.	H, F, Bg, S	14	May 24 - June 22. Av. 1.0 larvae per collection. Widespread.
Neophasia menapia Feld.	-	0	No specimens found or flights reported.
Nyctobia limitaria Stkr.	H	1	Port Eliza only occurrence.
Orgyia antiqua badia (Hy. Ed.)	Mb	1	One occurrence north of Comox.

OTHER NOTEWORTHY INSECTS - continued

Insect	Host	No. of collections	Remarks
Pissodes sitchensis Hopk.	S	2	Epidemic populations continue in areas where host found. 100% of stems infested at south end of Nimpkish Lake, 73% at Salmon River.
Pissodes terminalis Hopping	Pl	1	10% of terminals infested near Alberni Hwy. summit.
Scolytus ventralis Lec.	B	0	Scattered tree mortality on east coast of island. Especially near Comox.
Steremnius carinatus Boh.	-	-	Typical damage noted in Courtenay and Nimpkish areas conifer plantations but no specimens of insect found.
Stipnotia salicis Linn.	A, Populus alba	3	Spot infestation north of Courtenay. 57 trees involved. Also P. alba in Lewis Park, Courtenay, had high population but no damage.
Vespamia sequoiae Hy. Edw.	Pl	2	Stem attacks common in D. D. 021 and 022.

STATUS OF FOREST DISEASES

Shoestring Root Rot.

Shoestring root rot is of common occurrence in the forest stands of northern Vancouver Island. Symptoms of the disease, caused by the fungus Armillaria mellea (Fr.) Kummer, are observed in overmature, pole, reproduction, and planted stands. As may be expected, it is in the latter stands that conditions are most favourable for this parasite. Damaged roots, poor site conditions, abundance of inoculum from the previous stands, each contributes to the success of this organism.

Areas of reproduction in the Ash River Valley, the Tsable River drainage, and near Great Central appear to have a higher incidence of attack than other areas in D. D. 021 and 022. A plot established north of Great Central showed dieback symptoms and some root crown resinosus in 46.5 per cent of the stems. This dieback symptom was present on both Douglas fir and hemlock. Shoestring root rot was also collected from a red pine plantation in the Tsable River valley but only two per cent of the stems showed the characteristic symptoms in this area.

Exotic Plantations.

There were no particularly noteworthy disease conditions encountered in the exotic plantation examinations during 1962.

The sweetfern blister rust infection of Monterey pine on the Ash River remained the same as the previous year. Incidence of infection was 82 per cent and there was no more mortality. In 1961 this attack was the first record of the disease organism, Cronartium comptoniae Arth. attacking Monterey pine.

A Norway spruce plantation near Courtenay was heavily infested with an Adelgid aphid. This may be a new host record for the insect.

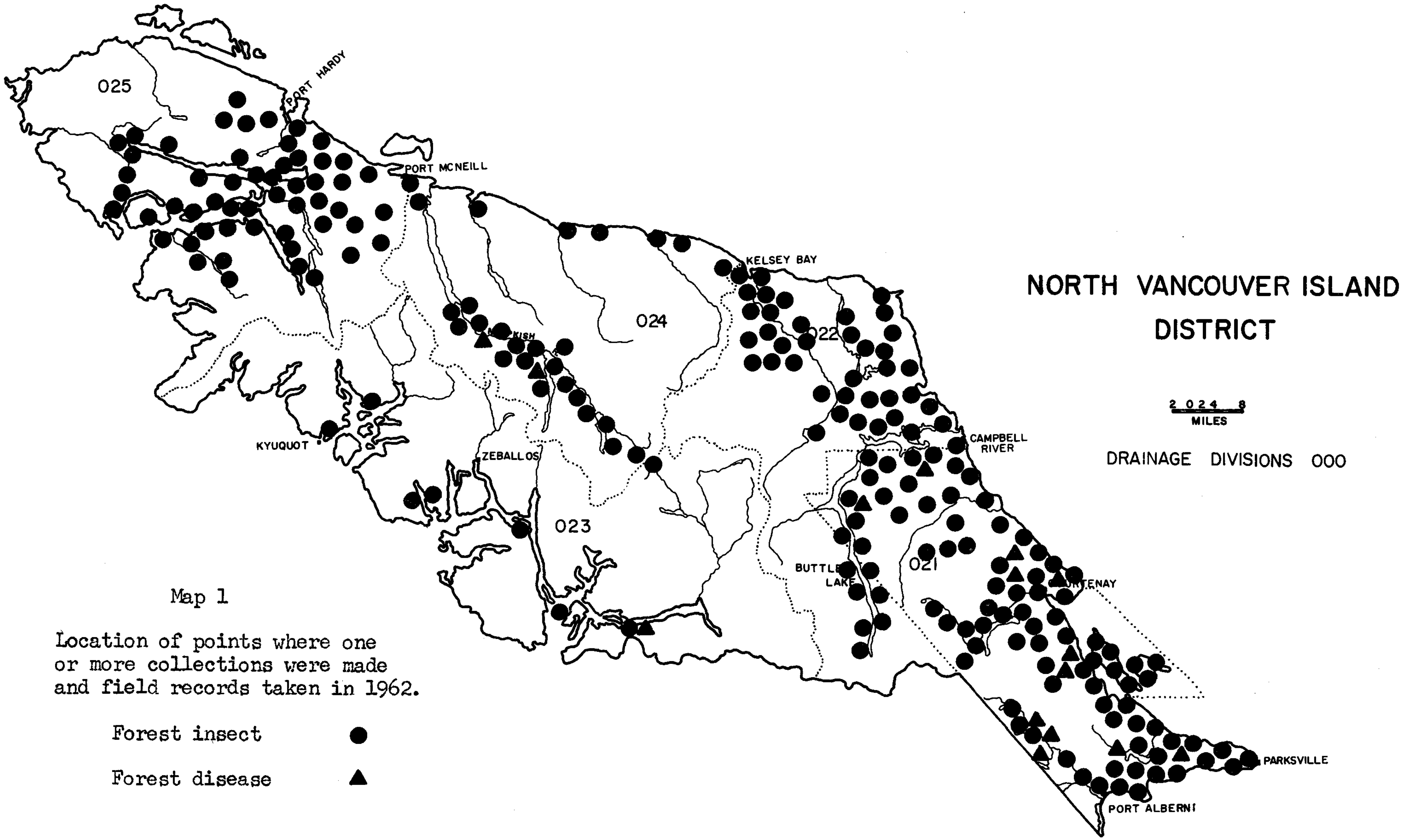
Other diseases found in the exotic plantations and elsewhere are listed in Other Noteworthy Diseases.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Abies amabilis	?Limacina alaskensis Sacc. & Scalia	Quinsam Lake	A snow mould fungus.
Arbutus menziesii	Didymosporium arbuticola Zeller	Horne Lake (1961)	New record. A leaf spot, causes yellowing and loss of foliage.
Pinus pinaster	Peridermium harknessii J. P. Moore	Coombs	A very damaging stem and branch gall rust.
Pinus radiata	Peridermium harknessii J. P. Moore	Coombs	As above
Pinus resinosa	Armillaria mellea (Fr.) Kummer	Tsable River	Root rot. 2 per cent showing symptoms of infection. Often very damaging in plantations.

OTHER NOTEWORTHY DISEASES - continued

Host	Organism	Locality	Remarks
Pinus sylvestrus	Peridermium sp.	Nimpkish	A stem rust of damaging potential.
Populus tremuloides Arth.	Melampsora albertensis Arth.	Comox	A leaf rust of poplar. Alternate host, Douglas-fir.
Populus trichocarpa	Melampsora occidentalis Jacks.	Woss Lake	A leaf rust of poplar similar to M. albertensis above.
Salix sp.	Melampsora epitea Thum.	Buttle Lake	A yellow leaf rust. Very heavy in area.



Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

VANCOUVER FOREST DISTRICT

MAINLAND SECTION

FOREST INSECT AND DISEASE SURVEY

VANCOUVER FOREST DISTRICT

MAINLAND SECTION

1962

D. H. Ruppel

INTRODUCTION

During 1962 Forest Biology Rangers were assigned to districts as follows:

D. H. Ruppel	-	South Vancouver
S. J. Allen	-	North Vancouver

The rangers collaborated during the early and late parts of the season and worked independently in mid-season.

Balsam woolly aphid damage to amabilis fir continued to be the most important problem in Vancouver Mainland Forest District in 1962. It is reported jointly at the end of this introduction.

Douglas-fir bark beetles continued to be active at Boston Bar and south of Hope.

Mountain pine beetles caused mortality of western white pine in the Hope-Boston Bar area. Damage in the Squamish-Pemberton area increased but has not been assessed. There is little current damage to pine in the Sechelt area.

Hemlock looper populations increased slightly around Toba and Jervis inlets but remained at a low level in the Vancouver area.

Silver-spotted tiger moth populations on Douglas-fir and other conifers were very high along the coast from Powell River to Tsawwassen.

Fall webworm, a pest of broad-leafed trees, was at a very high population level in the Sechelt Peninsula but declined in the Fraser Valley.

Tent caterpillars were locally abundant on Malcolm Island, at Alert Bay, and in the Fraser Valley.

Wind caused blowdown near Woodfibre during the winter of 1961-62 and in the Fraser Valley during July, 1962. A hurricane caused serious damage in the Vancouver area in October, 1962.

Balsam Wooly Aphid, _Adelges piceae_ (Ratz.) - D. H. Ruppel and S. J. Allen

Balsam woolly aphids continued to be a major factor in the deterioration and mortality of amabilis fir in the southwest portion of the Vancouver

Mainland Forest District. Attention is drawn to a report, "The Balsam Woolly Aphid in British Columbia", published in the 1961 volume of this report. The following information is in addition to the report mentioned and was obtained jointly by D. H. Ruppel, S. J. Allen and J. W. E. Harris.

In addition to routine sampling, an aerial flight of six hours duration was made over the general area in August.

The range of balsam woolly aphid has not changed substantially from that shown on the 1961 map. The presence of the aphid at Sechelt and Raffuse creeks is now considered doubtful, but other areas remain as marked. Some fringe areas, listed below, were ground checked. Fifty or more trees were examined in each area but no balsam woolly aphid attacks were found.

Alouette Lake - west side near lake level

Alouette to Stave lakes - height of land between

Cheekye River - north and south of river

Kay Bee Creek, Chehalis - four locations

Chapman Creek - upper drainage area

Sechelt Creek - four locations

Bear Creek, Clowhom Lake - to five miles

Clowhom River - lower portion

The insect was found on the headwaters of Roberts Creek but this is within the known infestation area. Twelve permanent study plots were examined in September and another plot established.

The number of red-topped amabilis fir within or adjacent to known balsam woolly aphid areas increased in 1962 compared to 1961 (Table 1). All the areas where flights were made in 1961 and 1962 are listed but areas where a comparison was not possible have been blocked off. The "remarks" column indicates sources of error due to salvage logging or inconsistent aerial courses. Mortality includes that by agencies other than balsam woolly aphid but no accurate percentage figures are yet available.

Table 1

Red-topped Amabilis Fir Within or Adjacent to Balsam Woolly Aphid, Adelges piceae (Ratz.), Areas as Determined by Aerial Surveys in

Vancouver Mainland Forest District.

Area	Red-topped firs 1961	1962	Remarks
Ashlu Creek	n.s. 1/	140	not verified as aphid
Sigurd Creek	n.s.	7	
Clowhom River	n.s.	10	
Taquat Creek	n.s.	22	
Chapman Creek	n.s.	8	
Dakota Creek	10	10	
McNair Creek	16	40	
Rainy River	15	15	logging and incomplete survey
McNab Creek	15	30	
Sechelt Creek	8	n.s.	no aphids found
Potlatch Creek	10	12	
Woodfibre Creek	25	10	heavy blowdown
Mill Creek	35	30	incomplete survey
Cheekye River	n.s.	n.s.	
Mashiter Creek	n.s.	n.s.	
Ring Creek	n.s.	36	
Mamquam River	10	110	only lower river valley surveyed in 1961, upper river only in 1962
Raffuse Creek	35	35	no aphids found

Table 1 - continued

Area	Red-topped firs 1961	Red-topped firs 1962	Remarks
Stawamus River	20	n.s.	
Brittania Creek	3	n.s.	
Furry and Downing creeks	10	n.s.	
Capilano River - Eastcap Cr.	25	40	
Capilano River - Hesketh Cr.	15	n.s.	
Capilano River - headwaters	n.s.	30	
Capilano River	0	+	
Cypress Creek	75	210	
Seymour Mtn (TV tower)	40	50	logging and incomplete survey
Seymour River	-	-	
Seymour River below lake	55)	140	logging in progress
Seymour River along lake	94)		logging in progress
Seymour River above lake	45	111	logging in progress
Lynn Creek - Grouse Mtn.	n.s.	n.s.	
Indian River	111	128	
Coquitlam Lake, south end	80	n.s.	
Coquitlam Lake, valley on east side	60	n.s.	
Coquitlam River, upper	30	5	survey incomplete
Boise Creek	n.s.	30	
DeBeck Creek	15	n.s.	
Pitt River - north of Pitt Lake to Homer Creek	6	-	
Pitt River - entire	n.s.	247	to Bucklin and Skale creeks
N. Alouette River	20	36	aphids not confirmed
Total (excluding blocked figures)	666	1,012	

1/ not surveyed

Table 2 summarizes balsam woolly aphid attacks and mortality of amabilis fir on study plots in Vancouver Mainland Forest District, 1962. Plots 1-12 were established in 1961 and plot 13 in 1962. Several trees had both gout and stem attacks. Discrepancies in the number of healthy trees are accounted for by difficulties in observing attacks in the crowns of tall trees and the disappearance of stem attacks from trees which were previously infested. The effects of stem attacks may not be immediately obvious. Fourteen of the 29 trees shown as dead in 1962 are known to have had either gout or stem attacks. The plots have not been established long enough to determine whether the remaining dead trees had been attacked. Miscellaneous diseases and insects have not been listed in this table. The balsam twig aphid, Mindarus abietinus Koch. was very prevalent on study plots in 1962.

It is anticipated that some blowdown may have occurred in balsam woolly aphid areas during the severe windstorms in October, 1962. Salvage logging is in progress at Seymour River, Seymour Mountain and Cypress Creek.

Single shipments of Aphidecta obliterata L. and Aphidoletes sp. predators were released on Seymour Mountain in 1962.

Summary

No spread of the infestation has been detected. However, an increasing rate of mortality was indicated within the known infestation area. Living trees with severe gout attacks are continuing to deteriorate.

Table 2

Summary of Balsam Woolly Aphid, Adelges piceae (Ratz.) Attacks and Mortality on Amabilis Firs on Study Plots for 1961 and 1962. Vancouver Mainland Forest District.

Plot no. and location	Healthy 1/		Gout attack 2/		Stem attack 2/		Dead (aphids) 3/		Dead (misc.) 4/		Total trees
	1961	1962	1961	1962	1961	1962	1961	1962	1961	1962	
1 - Cypress Creek	42	40	19	20	0	1	0	0	0	0	61
2 - Grouse Mtn.	31	36	16	3	0	3	0	4	1	2	48
3 - Rainy River	46	44	14	14	0	0	0	1	0	1	60
4 - Cypress Creek	36	30	14	19	0	0	0	1	0	0	50
5 - Indian River	37	42	0	1	13	6	0	0	0	1	50
6 - Raffuse Creek	45	44	5	4	0	0	0	0	0	2	50
7 - Brittania Creek	45	48	5	2	0	0	0	0	0	0	50
8 - Seymour River	39	46	10	1	0	0	0	0	1	3	50
9 - Seymour River	46	41	3	3	1	1	0	2	0	1	50
10 - Woodfibre Creek	43	45	6	3	0	0	0	1	1	1	50
11 - Dakota Creek	48	48	2	2	0	0	0	0	0	0	50
12 - McNair Creek	8	8	13	11	0	1	3	5	2	2	26
Sub total	466	472	107	83	14	12	3	14	5	13	595
13 - Parkdale	-	50	-	5	-	4	-	0	-	2	60
Total	466	522		88		16		14		15	655

1/ Includes all living trees without aphid symptoms.

2/ Three trees had gout and stem attacks.

3/ 1962 figures include trees dead in 1961.

4/ 1962 figures are cumulative and include all other causes of mortality.

FOREST INSECT AND DISEASE SURVEY

SOUTH VANCOUVER DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

SOUTH VANCOUVER DISTRICT

1962

D. H. Ruppel

INTRODUCTION

Field work in the South Vancouver District commenced in early April and continued to November. The summer was cool, damp and retarded, with above average precipitation in August. There were no serious interruptions in the survey schedule.

A total of 393 insect and 37 tree disease collections were made. Disease collections included those made in exotic plantations. Insect collections included negatives and 38 collections submitted by co-operators and other departmental personnel. Table 1 and Map 1 detail collections by host and locality respectively.

Survey work included an aerial survey of the balsam woolly aphid area. Part of August was taken up by special surveys as were the early and late parts of the season. Routine surveys commenced in mid May and terminated at the end of August.

Table 1

Collections by Hosts

South Vancouver District - 1962.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	55		Alder, red	9	
Cedar, (Cedrus sp.)	1		Apple sp.	3	
Douglas-fir	83	2	Ash sp.	1	
Fir, alpine	4		Aspen, trembling	3	4
Fir, amabilis	22	4	Birch, western white	1	
Fir, grand	3		Cherry spp.	3	1
Hemlock, mountain	2		Cottonwood, black		7
Hemlock, western	115	2	Dogwood, western flowering		1
Juniper sp.	1				
Larch spp.	1	5	Maple, sp.	1	
Pine, lodgepole and shore	19	3	Maple, broadleaf	1	
			Maple, vine	3	
Pine, ponderosa	2		Oak spp.	3	
Pine, Scots	1		Poplar spp.	2	1
Pine, western white	3		Willow spp.	15	4
Spruce sp.		1	Miscellaneous	18	2
Spruce, Colorado	1		No host	6	
Spruce, Engelmann	2				
Spruce, Norway	2		Total	69	20
Spruce, Sitka	7				
Total	324	17	Grand Total	393	37

STATUS OF INSECTS

Douglas-fir Bark Beetle, Dendroctonus pseudotsugae Hopk.

Douglas-fir bark beetles continued to cause mortality of Douglas-fir in the District. Estimates of some current losses of Douglas-fir in the Skagit River - Boston Bar area are shown in Table 2. Due to the cool damp summer some trees attacked in 1961 did not turn red or discolour in 1962. Several trees were found along Anderson River in early June which were still green, even though the bark beetles had emerged and the trees contained current ambrosia beetle attack and fruiting Polyporus volvatus Peck. At Ainslie Creek 15 Douglas-firs with numerous teneral adults in the beetle galleries had not changed colour by the end of August. Twenty-seven of 30 trees examined at mile 23 on Nahatlatch River had been attacked in 1962. The trees were overmature residuals in a discontinued logging operation. Slash and felled and bucked material in this area was infested in 1961. The table indicates losses in number of trees and volume, both of which are probably conservative estimates.

Beetle losses are expected to continue in the eastern part of the District.

Table 2

Estimate of Some Current Losses of Douglas-fir from Douglas-fir Bark Beetles, Dendroctonus pseudotsugae Hopk. by Regions and Compartments.

South Vancouver District, 1962.

Location	Region	Compartment	Dead fir (red-tops)	Vol. per tree (cu. ft.)	Volume (cu. ft.)
Klesilkwa River	12	16	20	34	680
Silverhope Creek	11	1D	10	34	340
Ainslie Creek	25	16	55	75	4,125
Nahatlatch River	26	15	96	38	3,648
Nahatlatch River	26	14	32	38	1,216
Nahatlatch River	26	11	6	38	228
Total			219		10,237

Mountain Pine Beetle, _Dendroctonus_ _monticolae_ Hopk.

Visual checks indicated a continuation of pine beetle infestations listed in the 1961 report. Table 3 shows some western white pine losses in the Skagit River - Boston Bar area. The number of trees and volume are probably conservative. The figures may include a small percentage of lodgepole pine along the Nahatlatch River. Figures were not obtained at Blackwater or Birkenhead lakes where salvage logging was in progress.

Numerous red-topped mature pines were evident in scattered areas through the valley from Squamish to Pemberton. These losses are not yet tallied. Salvage logging would probably be feasible in several areas.

The mountain pine beetle infestations are continuing in western white pine stands. There has been a steady loss of mature and immature trees throughout the range of the host.

Table 3

Estimate of Some Current Losses of Western White Pine from Mountain Pine Beetle, _Dendroctonus_ _monticolae_ Hopk. by Regions and Compartments. South Vancouver District, 1962.

Location	Region	Compartment	Dead pine (red-tops)	Volume (cu. ft.) 1/
Skagit River	12	17	300	10,050
Klesilkwa River	12	16	650	21,775
Silverhope Creek	11	1D	560	18,760
Silverhope Creek	11	1B	80	2,680
Nahatlatch River	26	15	10	335
Nahatlatch River	26	14	398	13,333
Nahatlatch River	26	11	12	402
Total			2,010	67,335

1/ The volume per tree was estimated at 33.5 cu. ft.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Spruce budworm populations were at the lowest level in several years. During the larval period, May 29 to August 1, 6.8 per cent of 177 collections contained an average of 1.2 larvae. Douglas-fir and western hemlock were the preferred hosts. No larvae were collected in drainages 043 and 045.

Douglas-firs in the previous infestation areas around Pemberton and Boston Bar continued to improve in appearance. Very little top-kill was recorded on the permanent study plots.

The spruce budworm is not expected to be a problem in the District in 1963.

Green-striped Forest Looper, Melanolophia imitata Wlk.

A further population decrease of this defoliator was indicated by collections during the larval period of June 10 to August 30. Table 4 shows the population trend of green-striped forest looper by drainage divisions as determined by collections for host species during the larval period. The table has been changed from previous years to show the percentage of samples, rather than the number of samples, containing the insect. A total for the District is added at the bottom of the table. The large number of collections for drainage 042 was a result of a more intensive search for western hemlock loopers (under separate heading). Western red cedar, western hemlock and Douglas-fir were the only hosts from which larvae were obtained in 1962.

The green-striped forest looper populations are expected to remain at a low level in 1963.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Populations of this insect remained at a low level in 1962. Table 5 shows the population trend of western hemlock looper by drainage divisions as determined by collections for host species during the larval period, which extended from June 7 to August 31.

The percentage of collections containing looper was relatively high in 1960 and 1961 in Stanley Park and at Coquitlam Lake in drainage 042. The occurrence decreased throughout 042 in 1962 with the exception of a localized area at Stave Falls. The large number of collections made in drainage 042 reflects the intensified detection survey designed to more accurately determine the population trend in the drainage. The maximum collection was 19 larvae from western hemlock. Particular attention was given this insect because of the recent hemlock looper outbreaks in Washington and Oregon.

Western red cedar and western hemlock were the chief hosts but no serious defoliation was observed and no serious problem is anticipated in 1963, although careful detection surveys will be continued.

Table 4

Summary of Green-striped Forest Looper, Melanolophia imitata Wlk.

by Drainage Divisions, South Vancouver District.

Drainage division	Total number of samples taken during larval period			Percentage of samples containing green-striped forest looper			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
040	16	9	24	31.3	0	4.2	3.0	-	1.0
041	12	26	18	16.7	26.9	0	2.3	3.7	-
042	43	43	101	39.5	23.1	5.9	1.6	1.7	1.4
043	5	22	23	0	9.1	4.3	-	2.2	1.0
044	34	35	7	20.6	0	0	1.7	-	-
045	25	30	21	12.0	3.3	0	1.8	1.0	-
Total	135	165	194	25.2	12.1	4.1	1.9	2.4	1.3

Table 5

Summary of Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

by Drainage Divisions, South Vancouver District.

Drainage division	Total number of samples taken during larval period			Percentage of samples containing western hemlock looper			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
040	20	9	23	10.0	11.1	4.3	4.5	1.0	1.0
041	9	26	27	0	0	7.4	-	-	1.0
042	61	43	100	16.4	39.5	15.0	3.8	4.9	3.1
043	4	21	28	0	0	7.1	-	-	1.0
044	18	23	6	0	8.7	0	-	2.3	-
045	32	29	35	18.8	10.3	0	1.4	1.8	-
Total	144	151	219	12.5	15.2	9.1	3.1	4.0	2.8

Western Cedar Bark Beetle, Phloeosinus punctatus Lec.

The plots established at Maple Bay (Cultus Lake) and Silverdale for the study of western cedar bark beetle were cleared and logged respectively. There was no apparent outbreak of the insect after the 1961 drought. No outbreak is expected after the cool, damp summer of 1962.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm remained at a low population level. An average of 1.0 larvae was found in 4.0 per cent of collections made during the larval period. The preferred hosts in 1962 were western hemlock and Douglas-fir. Occurrences of the insect were confined to the southern part of the District. No serious outbreak is anticipated in 1963.

Alder Sawfly, Hemichroa crocea (Fourc.)

Alder sawflies were at the lowest population level in several years and no serious damage to red alder was found.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

The population of this insect increased in the Vancouver area in 1962. Douglas-fir, western hemlock, and other coniferous hosts, particularly in Stanley Park and West Vancouver, were subjected to light defoliation. The unsightly webs and gregarious feeding habits of the insect attracted more attention than the damage warranted. Buds and new foliage are seldom damaged. Some concern was felt that the high population in Stanley Park might result in top-kill. A small amount of top-kill did occur but appears to have been limited to the leader extremities of a few western hemlock trees, some of which had six or more colonies of tiger moth larvae in the upper crown section.

Table 6 shows web counts of the silver-spotted tiger moth in the Vancouver area on various coniferous hosts as determined by roadside counts from a slow moving vehicle in the spring of 1961 and 1962. A preliminary count made in Stanley Park on November 21, 1962, recorded only 3.0 and 4.7 webs per mile compared with 214.5 and 10.2 respectively made in the spring. The webs counted in November represent the same colonies which will be counted in the spring of 1963. This may or may not indicate a decrease as webs are small and difficult to see in the fall. Two collections of larvae taken from Stanley Park in early April had approximately 50 and 88.6 per cent survival to the moth stage.

No accurate prediction of damage is feasible at present but the November examinations would seem to indicate a decrease in population can be expected in 1963.

Table 6

Web Counts of Silver-spotted Tiger Moth, Halisidota argentata Pack., in the Vancouver Area on Various Coniferous Hosts as Determined by Roadside Counts.

South Vancouver District.

Location	Miles travelled		No. of webs		Webs per mile	
	1961	1962	1961	1962	1961	1962
Beach Grove to Tsawwassen	5.4	4.8	201	223	37.2	46.5
Stanley Park (Entrance to Brockton Pt.)	2.0	2.0	115	429	57.5	214.5
Stanley Park (Lumberman's Arch - Prospect Pt. - Chilco St.)	4.0	4.0	6	41	1.5	10.2
West Vancouver (Marine Drive)	10.2	10.2	211	1,275	20.7	125.0

Fall Webworm, Hyphantria cunea Drury

The fall webworm infestation in the Fraser Valley decreased in intensity in 1962. The outbreaks at Yale and Harrison Lake, both areas of which were infested in 1961, also decreased this year. A few webs were seen along Lillooet River north of Harrison Lake where none had been previously seen. The usual wide range of deciduous hosts was attacked but walnut, an introduced species which has become common in the Fraser Valley, was the preferred host when present. The smaller than usual webs observed in 1961 could have been an indication that the infestation had lost much of its vigour and a decrease was imminent.

Table 7 shows web counts of fall webworm in the Fraser Valley on various deciduous hosts as determined by roadside counts. The number of webs per mile decreased greatly compared with 1961 in all localities where counts were made.

Table 7

Web Counts of Fall Webworm, Hyphantria cunea Drury, in the Fraser Valley on Various Deciduous Hosts as Determined by Roadside Counts. South Vancouver District.

Location	Miles travelled			No. of webs			Webs per mile		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
Pierdonville west	3.0	3.0	3.0	67	168	10	22.3	56.0	3.3
Pierdonville east	2.5	3.0	3.0	310	220	1	124.0	88.0	0.4
Rosedale north	2.8	2.8	2.8	43	197	45	15.4	70.4	16.1
Chilliwack (Camp Road)	7.4	7.4	7.4	52	553	113	7.0	74.7	15.3
Cultus Lake (SE side)	3.8	3.8	3.8	258	626	40	67.9	164.7	10.5
Yarrow east	3.6	3.6	3.6	97	415	54	24.2	115.3	15.0

Forest Tent Caterpillar, Malacosoma disstria Hbn. and Western Tent Caterpillar, Malacosoma pluviale Dyar

Tent caterpillar infestations continued in the Fraser Valley in 1962. A wide range of deciduous hosts were defoliated. The degree of defoliation varied greatly. Open growing shade trees and hedgerows were more heavily attacked than well-stocked stands of suitable host material.

Table 8 shows that the count of tent caterpillar webs on measured roadside strips for half-mile intervals on various deciduous hosts. Forest tent caterpillars and western tent caterpillars appeared to be hybridized to varying degrees in all areas. M. pluviale characteristics predominated from Ladner to Albion, while M. disstria predominated at Pitt Meadows. Tent types were likewise variable from little or no tent to tents 12 inches or more in length. Hawthorn and apple were preferred hosts in most places except number four strip at Pitt Meadows, where oak was heavily attacked. Rose, a generally preferred host of M. pluviale, was almost free of attack. Aspen, the preferred host of M. disstria, bore numerous 1961 egg bands from which larvae had emerged but apparently perished in the early instars.

The tent caterpillar population generally appeared to be declining. A high percentage of larvae failed to develop or mature, possibly due to the cool, damp, retarded season. It is not known what effect hybridization may have had on the population.

Egg sampling on the sample strips (Table 8) in late November gave the following counts.

Strip no. and locality	No. of trees sampled	No. of egg masses	Probable defoliation
No. 1 - Ladner	40 - hawthorn and apple	2	light
No. 2 - Cloverdale	12 - aspen and willow	7	light
No. 3 - Langley - Albion	14 - apple and birch	2	light
No. 4 - Pitt Meadows	8 - oak	2	light

There is a possibility of light infestations on all strips. Egg masses were considerably less numerous than in 1961.

No serious defoliation is expected in 1963 in the Fraser Valley.

Table 8

Web Counts of Tent Caterpillars, Malacosoma disstria Hbn. and Malacosoma pluviale Dyar, in the Fraser Valley on Measured Roadside Strips for Half-mile Intervals on Various Deciduous Hosts. South Vancouver District, 1962.

Strip by half-mile intervals		No. of webs	Type of web: club	compact	not classified	Remarks - host,1/ insect, etc.
No. 1	0 - 0.5	0	-	-	-	W, Haw, Plum
Ladner	0.5-1.0	0	-	-	-	Bi, Haw, W, Plum, Exotics.
east	1.0-1.5	10	5	1	4	Haw, Rose, W, Plum, Apple, Silver pop, Ash - M. pluviale and disstria
	1.5-2.0	55	21	30	4	Ash, Haw, Plum, Rose, M. pluviale and mixture
	2.0-2.5	137	40	93	4	Haw, Rose, W, D, Apple, Ash. M. pluviale and some mixture
No. 2 Cloverdale						
	0 -0.5	0	-	-	-	No host material
	0.5-1.0	0	-	-	-	" " "
	1.0-1.5	12	12	0	0	Apple Isolated tree
	1.5-2.0	37	37	0	0	Apple Isolated tree
	2.0-2.5	0	-	-	-	No host material
	2.5-3.0	0	-	-	-	" " "
	3.0-3.5	0	-	-	-	" " "
	3.5-4.0	52	42	6	4	Ash, Apple, W, D, M. disstria and M. pluviale mixture, several colonies with no webs.
	4.0-4.5	0	-	-	-	no host material
	4.5-5.0	61	19	30	-	Ash, Apple, Pincherry, D, A, Cot.
	5.0-5.5	1	1	-	n.c.2/	A, Cot, B, Cherry, Apple, D. Some feeding without webs, mixture.

Table 8 - continued

Strip by half-mile intervals		No. of webs	Type of web: club	compact	not classified	Remarks - host, 1/ insect, etc.
No. 3	0 -0.5	0	-	-	-	
Langley-	0.5-1.0	0	-	-	n.c. 2/	W, medium defoliation but no webs
Albion	1.0-1.5	1	1	0	n.c.	Apple, Haw, numerous small webs.
	1.5-2.0	3	1	2	n.c.	Haw, W, numerous small webs.
No. 4 Pitt Meadows	0 -0.5	n.c.	-	-	n.c.	M, oak, some *M. disstria* with no webs on oak, Haw and W defoliated across fields.
	0.5-1.0	n.c.	-	-	n.c.	Oak, almost every branch had an unclassified colony.
	1.0-1.5	n.c.	-	-	n.c.	Oak, Bi, Cot, A, mixture - shade trees only attacked.
	1.5-2.0	n.c.	-	-	n.c.	Oak, many small webs but mostly *M. disstria*, very few *M. pluviale* seen.

1/ W = native willow
Bi = birch
Apple = domestic and wild
A = trembling aspen
Oak = oak sp.
Haw = hawthorn
Plum = domestic and native
D = red alder
Cot = black cottonwood

2/ n. c. = not counted

Sitka-spruce Weevil, <u>Pissodes sitchensis</u> Hopk.

A young plantation of exotic spruces at Green Timbers was examined in early spring for weevil attacks. The trees are between one and four feet high and were transplanted late in 1960. Plots were designated F15, 16, 18, 19, 20 and 21. Three attacks were found; one on F20 and two on F18.

A search was made in August for spruce leaders containing weevils. The largest natural stand of Sitka spruce examined, in the vicinity of Squamish, had very few damaged leaders. A small proportion of spruce trees, growing under a cottonwood canopy along the Squamish River above Cheekye, were attacked in 1962 and in previous years. Damage was not as serious as normally found in open-grown trees. Most of these were maintaining good form with few multiple leaders but height growth was retarded. Exposed spruce reproduction near Alice Lake was heavily damaged but there were very few stands of reproduction present. A Norway spruce plantation at Green Timbers was heavily infested. Shade and ornamental spruces from Whalley to Matsqui were infested. Attacked trees were most plentiful near forested areas.

Based on observations, the Sitka-spruce weevil population declined compared with previous years. High mortality by parasites and predators was probably responsible for some of the decrease.

Poplar and Willow Borer, <u>Sternochetus lepathi</u> (L.)

Poplar and willow borer damage was much less severe in the District in 1962. Larvae were numerous early in the season but by midsummer very few insects could be found. In August less than five per cent of native willow stems contained borers and the number of galleries per stem was low. The only portion of the District where this insect has not been found is in the Pemberton area.

A poplar nursery near Yarrow was again infested. Early in the season 95 per cent of the canes appeared to be infested but by midsummer only 50 per cent showed indications of borings. Very few emerging adults were observed in late August. In 1961 the majority of borer attacks were in the stools; in 1962 most attacks were in the canes. Most of the attacked canes had reached a diameter of one inch or more in 1962, which probably accounted for the change in preference.

The poplar and willow borer prefers native willows to other hosts in the Fraser Valley and adjacent areas. Willow seldom exceeds four inches d.b.h. where repeated attacks are found.

Coniferous Sawflies, <u>Neodiprion</u> spp.

Sawflies were very common in small numbers in coniferous collections throughout the District. Larvae were collected from late May to the end of August. However, early instar larvae were collected from western hemlock during the last week of August, which would imply that the larval period extended into September.

The infestation recorded on lodgepole pine at Chilliwack Lake subsided with no serious damage to the host trees.

The largest collections made in 1962 were from western hemlock and amabilis fir at high elevations. The largest collection from hemlock at Ruby Creek contained only 116 larvae. Amabilis fir in the Chilliwack River basin yielded the maximum collection of 54 larvae for that host.

No defoliation was observed on any host.

A Tenthredinid, Amauronematus sp.

This sawfly was less noticeable in the Fraser Valley in 1962 than previous years. Some defoliation occurred around the fringes of an exotic poplar nursery near Yarrow. No damage was observed elsewhere on black cottonwood or willows.

Spruce Aphid, Neomyzaphis abietina (Wlk.)

Spruce aphids caused very little damage to spruce in the Fraser Valley in 1962. Sitka spruce trees in the Squamish area were free of aphid damage.

OTHER NOTEWORTHY INSECTS

South Vancouver District, 1962.

Insect	Hosts	No. collections	Remarks
Adelges tsugae Annand	H	2	Common in District
Altica sp.	W, Cot, Rose, D	4	Low level
Caripeta divisata Wlk.	H, B, C	16	Common, increase, max. col. 15 larvae
Contarinia sp.	F	1	Low level
Corythuca sp.	Pincherry	1	Locally abundant
Dichomeris marginella Fabr.	Juniper spp.	1	Severe on individual shade tree, Vancouver.
Ectropis crepuscularia Schiff.	F, H, C	4	Low level
Enypia packardata Tayl.	F, Ba	3	Uncommon
Epinotia hopkinsana Kft.	Pl	2	Discovered at Beach Grove

OTHER NOTEWORTHY INSECTS - continued

Insect	Hosts	No. collections	Remarks
Epirrita autumnata Gn.	H, Ba	4	Low level
Erranis vancouverensis Hulst	Py, O	2	Very low level
Feralia comstocki Grt.	H	3	Common, decrease
Gabriola dyari Tayl.	F, B, H, C, L	12	Common, increase
Neoalcis californiaria Pack.	F, H, C	5	Low level
Nepytia phantasmaria (Hy. Ed.)	F, H	2	Low level
Nymphalis antiopa Linn.	W	1	Locally abundant
Nymphalis californica Bdv.	Pop. sp.	1	Locally abundant
Nymphalis milberti Godt.	thistle	1	Locally abundant
Orgyia a. badia (Hy. Ed.)	H, C	7	Low level
Phyllocnistis populiella Cham.	A	-	Active on northeast fringes of District.
Rhyocìona buoliana (Schiff.)	-	-	Not found in routine surveys in 1962.
Semiothisa granitata Gn.	H, F, C.	21	Common, max. col. 30 larvae.

STATUS OF FOREST DISEASES

Important Diseases

Wind

Strong winds in July damaged cottonwoods in the Fraser Valley. Damage was light in natural stands but a plantation of black cottonwood on Herrling Island, XP 52, had many trees partly uprooted. The trees were four to six inches d.b.h. Spacing of the trees in the plantation encouraged the growth of larger crowns than in natural stands, resulting in increased wind resistance and weight.

Winds of hurricane force did severe damage in the Vancouver area in October. Three thousand trees were reported blown down in Stanley Park and many others were partially uprooted or sustained crown damage. Numerous shade trees and those left after clearing in the lower Fraser Valley were also damaged. The full extent of damage from the storm is not yet known.

Foliage Rusts

Foliage rusts were very prevalent on willows and poplars in the District. A leaf rust caused by Melampsora albertensis Arth. was collected from over-wintered trembling aspen leaves at Agassiz and Cultus Lake. Leaves of native willow at Squamish, Hope, Chilliwack, and Boston Bar were infected by Melampsora epitea Thüm. At Indian River, Squamish and Vancouver, black cottonwood foliage was infected by Melampsora occidentalis Jacks. Several collections of black cottonwood leaves had leaf spots the cause of which has not been identified. The leaf spot symptoms were common. The leaf fall from native and exotic poplars began early in August, due partly to foliage diseases.

Willow Blight

Symptoms of willow blight caused by Physalospora miyabeana Fuk. and Fusicladium salicisperdum (All. & Tub.) Lind. intensified on golden and weeping willows in the Fraser Valley. No extension of the range was detected.

Exotic Plantations

Examinations were made of 30 exotic plantations as listed (Table 9). In addition, several nurseries and unlisted plantations of exotics were examined.

Deterioration of Exotic Larches.

Eurolepis and Japanese larch trees in plantations along Alouette River are being severely damaged and killed by lesions caused by an undetermined agency. The plantations were established in 1927. Eurolepis larch varied from 2.0 to 11.0 inches d.b.h. with an average of 6.6 inches. Heights were from 20 to 100 feet with an average of 70 feet. Japanese larch ranged from 1.0 to 8.5 inches d.b.h. with an average of 5.5 inches. Average height was 56 feet with a range of 10 to 90 feet. The plots were swamped in 1959 but are still shaded from the edges.

The symptoms associated with damage are lesions, generally starting at ground level and extending from 3 to 30 feet up the stem. The lesions increase circumferentially until girdling takes place. The stems become rather fluted in shape but the bark is retained over the lesions. Table 10 indicates the occurrence of lesions and mortality on the plots. All the trees in the plots were examined except those which had been on the ground so long that they were badly rotted.

Table 9

Exotic Plantations Examined, South Vancouver District, 1962.

XP No.	Location	Tree sp.	Remarks
41-11	Alouette River	Larch, Eurolepis	see text
41-14	" "	Spruce, white	Green and healthy except for two stem lesions of undetermined cause.
41-16	" "	Larch, Japanese	see text
41-18	" "	Pine, red	all dead
41-19	" "	Pine, Scots	Two of 48 trees living and in poor shape - remainder dead.
41-20	" "	Oak, red	No mortality - some stems spindly.
41-21 22 23	" "	Sequoia, giant)	Good survival - 3 to 14" d.b.h.- ht. to 80' - two dead tops noted - doing best in openings.
41-24	" "	Maple, sugar	Healthy and growing - improved after release in 1959.
41-25	" "	Oak, red	No mortality - some stems spindly.
41-26	" "	Ash, white	Good survival - mechanical damage has caused some suckers - trees long and spindly.
43	Green Timbers	Pine, Scots	Continued deterioration as in 1961.
44	" "	Pine, Scots	Good survival - bud nipping and over-topped by ground cover - otherwise healthy.
45	" "	Pine, red	Healthy and vigourous - to 7" d.b.h. and 20' ht. benefited by swamping in 1959.
46	" "	Oak, English	Stand improved from 1959. "Dead" tree suckered from root collar. Light defoliation by <u>Malacosoma disstria</u> Hbn.
52	Herrling Island	Cottonwood, black and exotic poplars	Wind damage in July - see text under wind - all species 2" d.b.h. and under "walked down" and browsed by cattle - unidentified leaf spot very prevalent.
77	Green Timbers	Pine, red	Young trees bud-nipped - otherwise O. K.
92	Haney	Larch, European Eurolepis and Japanese	All doing well after initial mortality of European larch.
93	"	"	as for XP 92
94	"	"	Good survival, improved rigidity but still top heavy.

Table 9 - continued

XP No.	Location	Tree sp.	Remarks
95	Haney	Larch, Japanese	Very healthy but lacks rigidity.
97	"	Pine, Corsican	Good survival, growing vigourously, some top heavy, slow flushing.
102	"	Poplar, Carolina	O. K. in May, 1962.
103	"	Poplar, mixture	O. K. in May, 1962.
104	"	Poplar, Canadensis regenerata	Growing well with large variations in size.
105	"	Poplar, regenerata	Good growth, no damage.
107	"	Populetum	Apparently healthy, big variation in growth.
108	"	Poplar, grandis	Healthy.
109	"	Poplar, robusta var. bachelieri	Healthy but slow growing and some multiple stems.
112	"	Fir, grand	Healthy.

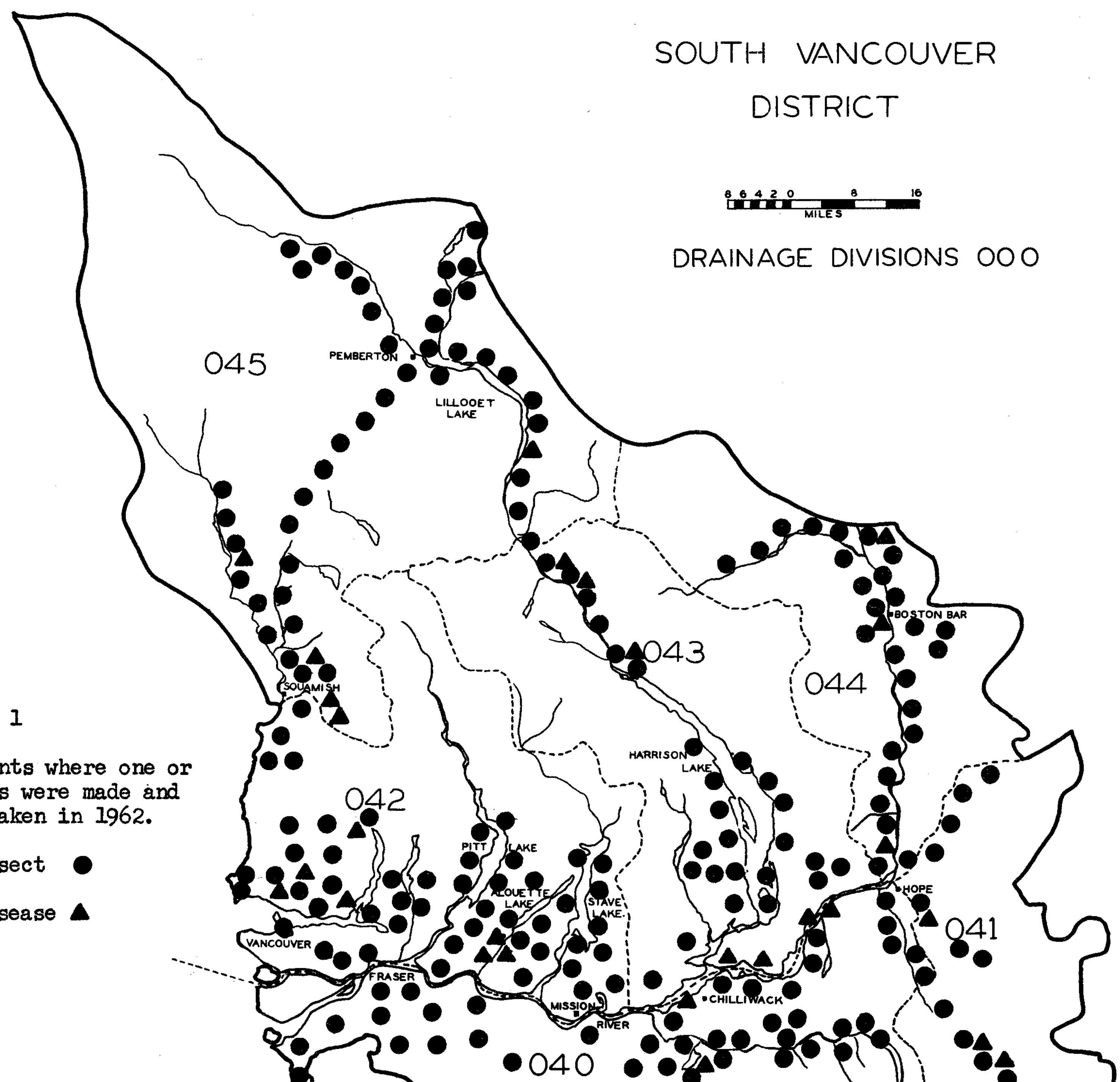
Table 10

Occurrence of Lesions and Mortality of Undetermined Cause of Eurolepis and Japanese Larches along Alouette River. South Vancouver District, 1962.

Larch sp.	No examined	Living	Dead	%Dead	Cankered (living and dead)	% Cankered
Eurolepis	34	22	12	35.3	32	94.1
Japanese	38	20	18	47.4	32	84.0

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Fir, amabilis	*Nectria* sp.	Seymour Mtn. Grouse Mtn.	Saprophytic on trees killed by balsam woolly aphid.
Larch, Japanese	*Armillaria mellea* (Fr.) Kummer	Alouette River	New host record, root rot.
Larch, Eurolepis	*Odontia bicolor* (Alb. & Schw. ex Fr.) Bres.	Alouette River	Butt rot, new host record.
Cherry sp.	*Taphrina cerasi* (Fuckel) Sadeb.	Chilliwack	Causes leaf wilt.
Hemlock, western	*Coccomyces* sp.	Squamish River	Dieback, under study.
Poplar sp. (hybrid, Brooks No. 10)	*Marssonina brunnea* (Ellis & Everh.) Sacc.	Chilliwack	Leaf spot, new record; heavy leaf cast.



Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲

FOREST INSECT AND DISEASE SURVEY

NORTH VANCOUVER DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

NORTH VANCOUVER DISTRICT

1962

S. J. Allen

INTRODUCTION

The 1962 survey started April 9 with silver-spotted tiger moth road surveys and terminated on September 12 due to the construction of the new ranger cabin for the North Vancouver District at Powell River.

Balsam woolly aphid aerial surveys were flown and plots examined in co-operation with the South Vancouver Ranger as in 1961. A combined report appears in the Introduction of the Vancouver Forest District.

Eighty-nine tree disease samples were submitted in 1962 of which the majority were hemlock diebacks and cankers. Two samples contained a new species of Nectria and seven other new records were found, of which one was a disease parasite and one a lichen. A total of 465 insect collections were made during the season.

Forest Insect Disease collections by host trees are shown in Table 1 and the distribution of samples is shown in Map 1.

Table 1

Collections by Hosts

North Vancouver District, 1962.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	73	1	Alder, mountain	19	3
Cedar, yellow	-	1	Alder, red	1	-
Douglas-fir	81	7	Apple	1	-
Fir, amabilis	18	12	Birch, western white	-	1
Fir, grand	10	2	Cascara	-	1
Hemlock, mountain	1	-	Cottonwood, black	1	2
Hemlock, western	198	43	Dogwood, flowering	-	2
Pine, lodgepole	3	3	Hawthorn	1	-
Pine, ponderosa	1	2	Maple, broad-leaved	3	3
Pine, white	1	-	Poplar, European white	-	1
Spruce, Sitka	32	1	Willow	2	-
			Miscellaneous	8	2
			No host	11	-
Total	418	72		47	15
			GRAND TOTAL	465	87

STATUS OF INSECTS

Sawflies, Neodiprion spp.

The average number of Neodiprion per collection decreased in 1962 although the distribution of collections containing larvae remained about the same as in 1961. The larval period was from June 1 to August 14. Defoliation from 1960 and 1961 was still visible in some areas. Table 2 shows the population decline since 1960, which was most conspicuous in drainage divisions 061 and 065. The largest numbers found in 1962 were at Unwin Lake, 148 larvae per collection; Brem Bay, 150 larvae; and Brem River, 85 larvae. Western hemlock was the preferred host but larvae were also found on Douglas-fir, amabilis fir, grand fir and Sitka spruce.

Table 2

Summary of Neodiprion spp. Sawflies found by Drainage Divisions, North Vancouver District.

Drainage division	Total number samples taken during larval period			Per cent samples containing sawfly			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
060	0	16	25	-	18.7	44.0	-	1.3	1.5
061	41	105	128	68.0	47.0	31.2	198.0	27.9	4.8
062	8	15	44	50.0	80.0	43.2	4.5	29.2	29.9
063	8	19	40	38.0	16.0	20.0	3.3	1.0	3.4
064	5	38	37	40.0	19.7	48.7	1.5	1.1	7.8
065	5	28	24	80.0	50.0	37.5	10.2	43.3	7.8
066	0	33	0	-	18.2	-	-	7.7	-
067	0	10	15	-	80.0	66.7	-	5.3	6.8
068	0	10	20	-	30.0	30.0	-	3.0	17.0
Total	67	272	333	61.2	37.8	36.2	137.0	22.9	9.76

Hemlock Looper, Lambdina fiscellaria lugubrosa Hulst

The hemlock looper population increased in both occurrence and abundance in 1962, notably in drainages 061, 062 and 064 (Map 2). The highest populations were found in the Brem River Valley, Toba Inlet, where nine and six larvae were taken in two collections from amabilis fir. A total of 50 positive samples throughout the lower part of the district contained 116 larvae, an average of 2.3 larvae per sample (Table 3). The preferred hosts were western hemlock, western red cedar and Sitka spruce. Douglas-fir and amabilis fir were secondary hosts. Out of 116 larvae submitted, 78 were reared and 10 larvae or 13 per cent died of parasitism.

Table 3

Summary of Hemlock Looper found by Drainage Divisions,

North Vancouver District.

Drainage division	Total number samples taken during larval period			Per cent of samples containing looper			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
060	2	12	19	0	0	5.3	-	-	3.5
061	55	65	116	10.9	11.0	16.4	2.7	2.3	1.8
062	3	16	42	0	19.0	30.9	-	1.5	3.2
063	8	15	38	0	0	16.0	-	-	2.3
064	12	26	36	0	8.0	22.2	-	2.3	2.2
065	9	21	22	0	0	0.0	-	-	-
066	0	20	0	-	0	-	-	-	-
067	0	8	18	-	0	0.0	-	-	-
068	0	1	19	-	0	16.0	-	-	1.5
Total	89	184	310	6.7	6.4	16.1	2.7	2.1	2.3

Green-striped Forest Looper, Melanolophia imitata Wlk.

The green-striped forest looper population remained at a low level for the second consecutive year. The number of larvae collected in 1962 was slightly less than in 1961. Collections containing this species were limited to Drainage Divisions 060, 061 and 062 and the preferred host was western hemlock.

Black-headed Budworm, Acleris variana Fern.

The black-headed budworm population remained at a low level in 1962. Nine larvae were collected between Halfmoon Bay and Bute Inlet (Map 2) in 1962 compared to 13 in 1961.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

The silver-spotted tiger moth population quadrupled in 1962 and webs were conspicuous until early July. The heaviest population was from Gibsons Landing to Sechelt where 1,060 webs were counted in 14.3 miles, an average of 74 webs per mile. Defoliation of branch tips appeared severe, but current foliage growth soon covered the damage. Table 4 lists the web counts on highway 101. Of 147 larvae reared, 51, or 35 per cent were parasitized.

Table 4

Silver-spotted Tiger Moth Web Count, Highway 101,

North Vancouver District.

Area	Distance (miles)	1960		1961		1962	
		Total webs	Webs/ mi.	Total webs	Webs/ mi.	Total webs	Webs/ mi.
Langdale - Earl Cove	53	27	0.5	565	10.7	2,079	39.0
Saltery Bay - Powell R.	22.7	5	0.22	51	2.2	573	25.2
Powell River - Lund	13.8	3	0.2	82	5.9	409	29.0
Total	89.5	35	0.38	698	7.6	3,051	33.0

Fall Webworm, Hyphantria cunea Drury

The intensity of the fall webworm infestation increased in 1962. The heaviest population occurred between Sakinaw and Ruby Lake. The colonies formed in groups on many small alder trees and spread out among the branches until their webs coalesced, forming giant webs which enveloped whole trees. Most of these alders were completely defoliated by September. Secondary hosts included most of the deciduous trees. The infestation extended from Howe Sound to Lund and Jervis Inlet. One larva out of 27 reared was parasitized.

Western Tent Caterpillar, Malacosoma disstria Hbn.

Infestations of tent caterpillar were reported at Malcolm Island and Alert Bay by the B. C. Forest Service. No other outbreaks were reported. Of considerable interest were two colonies of early instar larvae collected at Sechelt, both established on new shoots of ponderosa pine.

OTHER NOTEWORTHY INSECTS

Insect	Host(s)	No. of collections	Remarks
Caripeta divisata Wlk.	H, F, S	16	Jervis Inlet to Knight Inlet, average 3.0 per sample, largest sample 6 larvae.
Choristoneura fumiferana Clem.	F, H	3	Stillwater, Misery Creek, and Narrows Inlet, two collections in 1961.
Contarinia sp.	F	2	Porpoise Bay and Halfmoon Bay, light attacks on single trees.
Ectropis crepsucularia Schiff.	C, D Hawthorn	3	Storm Bay, Hemming Bay and Vancouver Bay.
Eupithecia unicolor Hulst	C, H, F	17	Howe Sound, Sechlet Peninsula, Powell River - Saltery Bay, Sechelt Inlet, small numbers of larvae.
Gabriola dyari Tayl.	H, S	10	Howe Sound to Sechelt Peninsula and Hotham Sound, all single larvae in collections.

OTHER NOTEWORTHY INSECTS - continued

Insect	Host(s)	No. of collections	Remarks
Hemicroa crocea Fourc.	D	1	Powell River, population very light.
Neoalcis californiaria Pack.	H, C, F	22	Howe Sound to Lund, all collections very small.
Nepytia phantasmaria Stkr.	H	5	Clowhom Lake, Britain River, Deserted Bay and Southgate River. None in 1961.
Nyctobia limitaria Stkr.	H	2	Tzoonie River and Smanit Creek single larvae in collections.
Orgyia antiqua badia Hy. Edw.	H	3	Brem River, Redonda Island, Stafford Lake, single larvae in collections.
Semiothisa sp.	H, F, S	18	Jervis Inlet to Knight Inlet, average 3.0, highest sample 8 larvae.

STATUS OF FOREST DISEASES

Important Diseases

Dwarf Mistletoe on Western Hemlock

Old growth hemlock stands infected with dwarf mistletoe, Arceuthobium campylopodum Engelm. forma tsugensis (Rosend.) Gill are of common occurrence throughout the coastal region of British Columbia. Mistletoe damage encountered in these age classes, while appreciable and important to record for inventory purposes, is beyond recovery. The importance of mistletoe infection in such stands, therefore, stems from the fact that it serves as a potential reservoir of inoculum to carry infection to the new forest. Since the conversion period offers the best and sometimes the only opportunity for the economical control of dwarf mistletoe, the removal or destruction of infected trees at that time is most essential. One or more survivors are sufficient to carry infection from the old stand to the new. This danger was well illustrated by 14 new reports in 1962 of mistletoe infection in second growth hemlock. All infections were attributed to inoculum from trees surviving after logging or fires. In most cases infection could have been prevented had all infected material been destroyed during logging.

Dwarf Mistletoe and Cronartium Gall Rust on Lodgepole Pine.

Heavy infections by dwarf mistletoe, *Arceuthobium campylopodum* Engelm. forma *tsugensis* (Rosend.) Gill and Cronartium gall rust, *Peridermium harknessii* J. P. Moore were found in a small stand of lodgepole pine in Chapman Creek Valley. The trees ranged from 3 1/2 inches to 9 inches d. b. h. and thirty to fifty feet in height. Out of 50 trees, 32 were infected by dwarf mistletoe, 36 by Cronartium gall rust and five were dead. Only one tree appeared free from both diseases.

Terminal Damage of Amabilis Fir

Examinations of terminal damage to amabilis fir were carried out at the 3,000 foot level of the Mount Elphinstone area in 1961 and 1962. Animal damage to the terminals was noticeable both years. The terminals were neatly severed leaving a cleanly cut stub; some still having indications of tooth marks. The causal agents are suspected to be deer, squirrels or grouse. Out of a total of 50 trees examined, 10 trees were affected compared to 17 in 1961 and nine prior to 1961.

Wind Damage

Two areas of windfall were found in 1962 at Woodfibre and Call Inlet. An area of around four acres of overmature hemlock-balsam was blown down at the 1,000 foot level on the south side of Henrietta Creek. On the south side of Call Inlet, two rectangular swaths of blowdown of immature hemlock were found; the trees had uprooted and fallen in a criss cross pattern. These swaths were oriented in a north-south direction from sea-level to 200 feet and involved nearly six acres. Further wind damage is likely to be found in 1963 from the severe winds of Hurricane Freda, November, 1962.

OTHER NOTEWORTHY DISEASES

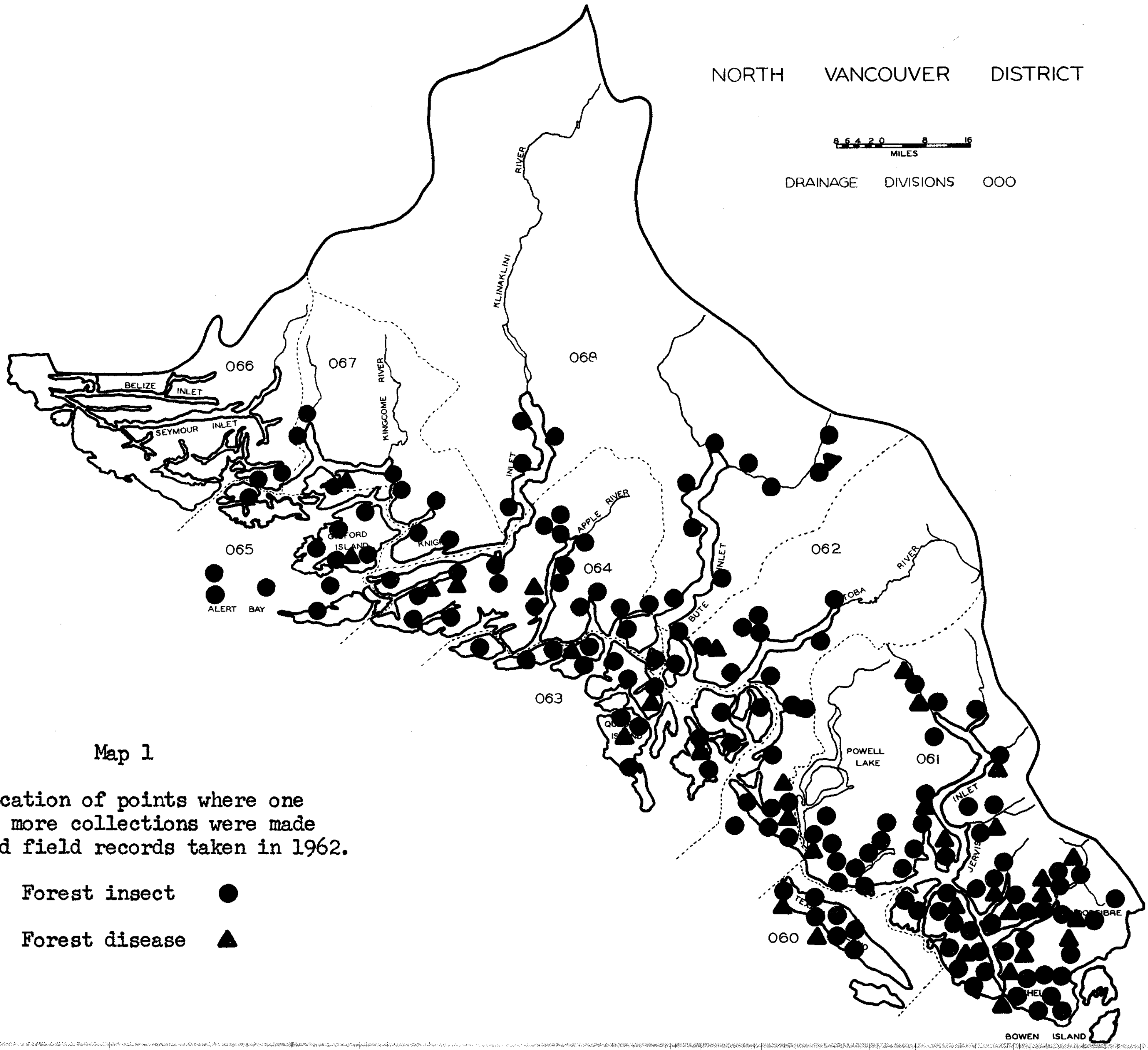
Host	Organism	Locality	Remarks
Alder, red	*Cytospora* sp.	Pender Harbour	Associated with lesions and die back of alder and willow.
Birch, western white	*Ganoderma* sp.	Southgate River, 18 mi.	Associated with decay of hardwoods.

OTHER NOTEWORTHY DISEASES - continued

Host	Organism	Locality	Remarks
Cedar, western red	Didymascella thujina Durand	Roberts Creek (headwaters)	Causes cedar leaf blight, characterized by reddening and dying of foliage of red cedar.
Cedar, yellow	Gymnosporangium nootkatense Arth.	Sechelt Peninsula, Caren ridge	Rust of little consequence, more damaging to secondary hosts - Sorbus spp. and Oregon crabapple.
Cottonwood, black	Taphrina populi-salicis Mix	Quatam River	Ascomycete, causes yellow leaf blister of poplars.
Cottonwood, black	Melampsora occidentalis Jacks.	Skwawka River	Leaf rust, light infection on underside of leaves, primary host - Douglas-fir.
Fir, amabilis	Aleurodiscus amorphus (Pers.) Rab.	Rainy River	Causes cankers on main stem, occasionally kills suppressed saplings.
Fir, amabilis	Dasycypha agassizii (B. & C.) Curt.	Rainy River	Associated with blister rust lesions of white pine and other weakened or dead material.
Fir, amabilis	Gloeosporium sp.	Rainy River	Associated with cankers and dieback of branches. New host record.
Fir, amabilis	?Hyphosoma lumbricoidea (Dearn.)	Sechelt Peninsula, Caren ridge	"Sooty mould" on foliage of lower limbs, new record.
Fir, amabilis	?Limacinia alaskensis Sacc. & Scalia	Roberts Creek (headwaters)	Associated with snow-mould matting on suppreseed foliage of lower limbs at higher elevations.
Fir, amabilis	Nectria fuckeliana Booth	Rainy River	Associated with flags and dead upper main stem of amabilis fir. New host record.
Fir, amabilis	Stilbella sp.	Parkdale	Orange pustules, associated with necrotic area of bark and cambium. New host record.

OTHER NOTEWORTHY DISEASES - continued

Host	Organism	Locality	Remarks
Fir, Douglas	Phaeocryptopus gaeumannii Rohde	Goliath Bay	Associated with needle discoloration, "Adelopus" or Swiss needle cast, not serious in W. N. America although it has been injurious in New England states plantations.
Fir, Douglas	Rhabdocline pseudotsugae Syd.	Halfmoon Bay, Porpoise Bay	Light attacks on reproduction on 1961 foliage.
Fir, grand	Peridermium pseudo-balsamium (Diet. & Holw.) Arth. & Kern.	Powell River and Halfmoon Bay	Rust, causing some damage to saplings, usually little retarding of growth. Secondary host unknown.
Hemlock, western	Caliciopsis pseudotsugae Fitzp.	Sechelt Peninsula, Howe Sound, Powell River, Salmon Inlet	Causing branch cankers
Hemlock, western	Coccomyces sp.	Roberts Creek (headwaters)	Associated with dieback of western hemlock. New record.
Maple, broad-leaf	Rhytisma punctatum (Pers.) Fr.	Salmon Inlet and N. side Squirrel Cove.	Leaf spot of broad-leaf maple, common in 1962, more abundant in 1961.
Pine, western white	Cephalosporium sp.	L. 190 Texada Island	Associated with cankerous area on branch. New record.
Pine, western white	Peyronelia sp. on Cronartium ribicola J. C. Fisch.	L. 190 Texada Island	Possible parasitic action on blister rust. New record.
Spruce, Sitka	Retinocyclus sp.	Gillies Bay road (Texada Island)	Associated with cankers and die-back of host species.

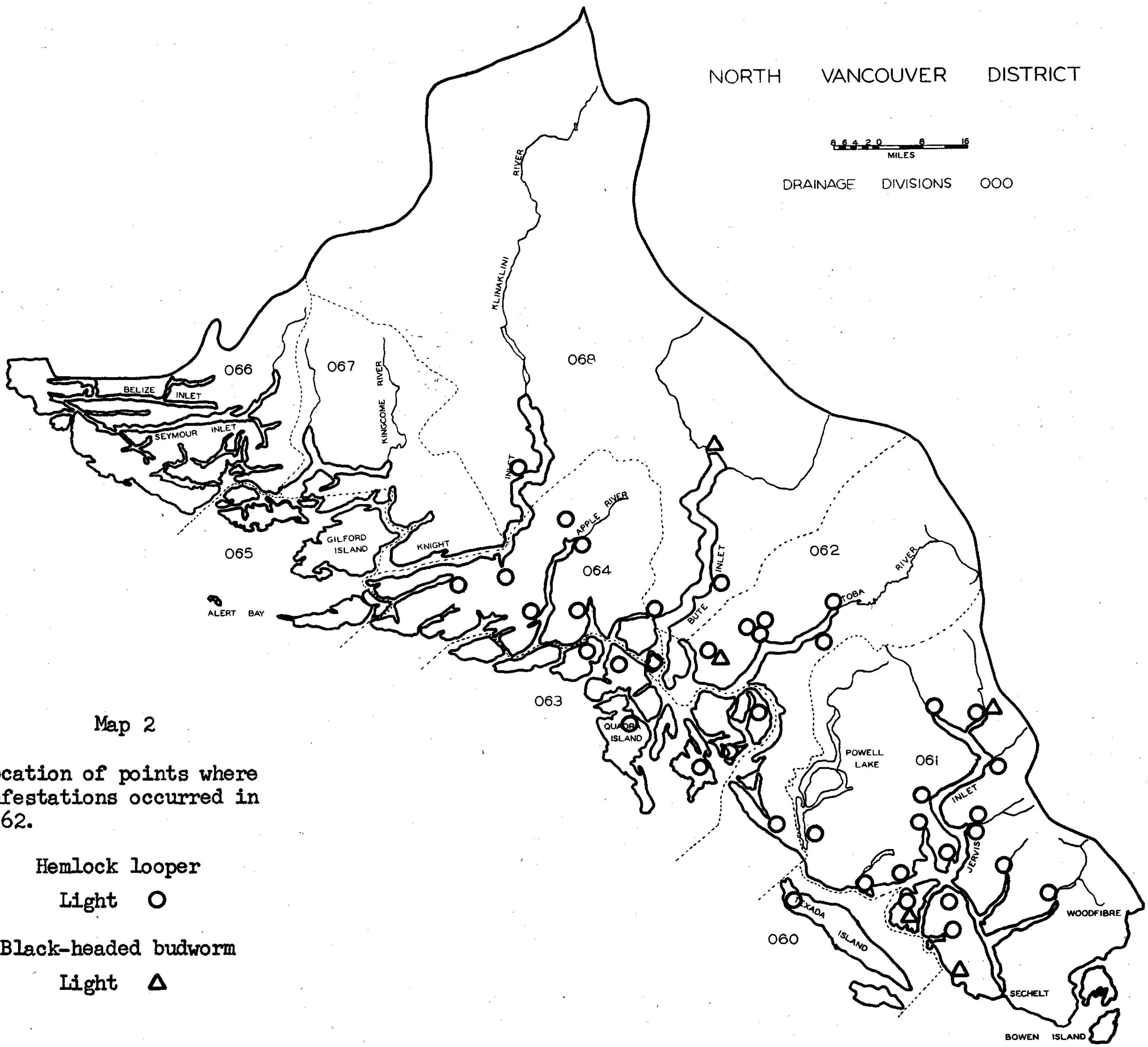


Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲



Map 2

Location of points where infestations occurred in 1962.

Hemlock looper

Light ○

Black-headed budworm

Light △

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

PRINCE RUPERT FOREST DISTRICT

FOREST INSECT AND DISEASE SURVEY

PRINCE RUPERT FOREST DISTRICT

1962

E. G. Harvey

INTRODUCTION

In 1962 A. K. Jardine was transferred from West to East Prince Rupert Ranger District and E. G. Harvey went from East to West Prince Rupert Ranger District. D. Ruth remained in South Prince Rupert.

A new 20-foot fibreglass boat with a 75 horsepower outboard motor greatly facilitated the survey of the coastal areas in both the South and West Prince Rupert districts.

The two-year-cycle spruce budworm infestation in the Babine Lake area decreased to the lowest level since 1954. The population persisted in some localized areas.

The one-year-cycle spruce budworm caused heavy defoliation in the Kitimat area in 1962. The outbreak is expected to continue.

Spruce terminal damage was severe again in the Queen Charlotte Islands. The damage, formerly attributed to *Zeiraphera* spp. has now been found to be the result of attacks of three different insects: *Zeiraphera* sp., *Epinotia* sp., and *Rhabdophaga* sp.

The saddle-backed looper infestation at Kitimat declined to negligible proportions.

Bark beetle populations increased to large numbers in amabilis fir stands in the Kitimat, Skeena, and Zymoetz River valleys.

The forest tent caterpillar infestation increased slightly in extent; the intensity of attack remained high.

Populations of the green spruce aphid persisted in the coastal spruce stands, but defoliation was light.

The black-headed budworm remained at a low level with the exception of several localities.

A weevil, *Steremnius carinatus*(Boh.), which is causing concern in the southern coastal area of British Columbia, was found in infestation proportions on the Queen Charlotte Islands.

Many varities of exotic and hybrid poplars in the nursery at Terrace were infected with a canker disease.

Several new host and area records of tree diseases were established in 1962.

FOREST INSECT AND DISEASE SURVEY

SOUTH PRINCE RUPERT DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

SOUTH PRINCE RUPERT DISTRICT

1962

D. S. Ruth

INTRODUCTION

The survey of the South Prince Rupert District commenced on July 16 with the newly assigned survey boat M. V. Forest Biologist II. Favourable weather conditions and the assistance of D. G. Collis, Ranger for the South Vancouver Island District, enabled coverage of the district to be completed by August 2nd.

A total of 160 insect and five forest disease samples from the South Prince Rupert District were submitted to the Victoria laboratory. Insect and disease collections by hosts are shown in Table 1. The locations of forest insect and forest disease collections are shown on Map 1.

Table 1

Collections by Hosts

South Prince Rupert District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	9	-	Alder, red	5	-
Douglas fir	2	-	Elder	1	-
Fir, amabilis	9	-	Elder, Blue-berry	1	-
Fir, grand	1	-	Elder, Red-berry	1	-
Hemlock, western	81	4	Willow	2	-
Spruce, Sitka	30	1	Miscellaneous	17	-
			No host	1	-
			Total	28	-
Total	132	5	Grand Total	160	5

STATUS OF INSECTS

Black-headed Budworm, <u>Acleris</u> <u>variana</u> (Fern.)

A decrease in the black-headed budworm population was evident in most sections of the District in 1962 (Table 2). In 1961, 72 larvae were collected in a sample from western hemlock in a bay .03 miles south of Bish Creek on Douglas Channel. A collection made at the same location in 1962 contained 12 larvae. The only area where an increase occurred was in drainage 081 on Dean Channel. Two samples made at separate locations on western hemlock contained a total of 138 larvae. The first collection was made in Jenny Inlet where 23 larvae were found. The second collection made at Humpback Creek contained 115 larvae. No defoliation was visible on the current foliage at either of the above locations.

Table 2

Summary of Black-headed Budworm found by Drainage Divisions,

South Prince Rupert District, 1960 - 1962.

Drainage division	Total number of samples taken during larval period			Percentage of samples containing black-headed budworm			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
080	11	5	28	18.2	40.0	0	1.0	2.3	0
081	41	3	29	17.0	33.0	51.7	8.9	30.0	16.6
082	10	-	-	0	-	-	-	-	-
083	84	35	57	52.3	37.1	28.0	16.2	10.9	4.4
Total	146	43	114	36.3	37.2	27.1	14.6	11.1	10.4

Green-striped Forest Looper, <u>Melanolophia</u> <u>imitata</u> Wlk.

The population level of the green-striped forest looper increased slightly over that of the two previous years, 1960 and 1961. (Table 3). The largest single collection contained 12 larvae and was made on the insects preferred host, western hemlock, at Bish Creek on Douglas Channel. A total of 16 collections contained an average of 3.6 larvae per collection. Eleven samples were made on western hemlock, two on western red cedar and three on Sitka spruce.

Table 3

Summary of Green-striped Forest Looper found by Drainage Divisions, South Prince Rupert District, 1960 - 1962.

Drainage division	Total number of samples taken during larval period			Percentage of samples containing green-striped forest looper			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
080	16	5	28	25.0	20.0	0	1.0	1.0	0
081	41	3	29	12.1	66.6	6.8	1.0	1.0	2.2
082	9	0	0	11.1	0	0	1.0	0	0
083	84	35	56	15.4	17.1	25.0	2.4	1.4	3.8
Total	150	43	113	15.3	20.9	14.1	2.0	1.3	3.6

Spruce Budworm, Choristoneura fumiferana (Clem.)

Sampling after the peak larval period in some sections of the district prevented an accurate assessment of the spruce budworm population. However, the average number of larvae per sample increased appreciably over that of the previous year. In 1961, 18 collections from Sitka spruce averaged 4.3 larvae per sample. This year 15 collections made on the same host averaged 20.2 larvae. The largest populations occurred in the Kitimat Arm area, where heavy defoliation on the current foliage of amabilis fir was observed along the west side of Douglas Channel. This is a continuation of the Kitimat spruce budworm infestation and a more detailed account of the Kitimat outbreak is covered in the West Prince Rupert District Report.

Saddle-backed Looper, Ectropis crepuscularia Schiff.

Fewer saddle-backed loopers were found in the Kitimat - Douglas Channel area than in 1961, due to the collapse of the Kitimat infestation. A total of five collections, made between the Kitimat Dock and Emsley Cove, averaged 28.8 larvae per sample. Hosts were western hemlock, Sitka spruce and western red cedar. In 1961 collections made in the same area averaged 53.1 larvae per sample from western hemlock, and 45.2 from Sitka spruce. The largest single collection in 1962 contained 113 larvae and was made on western red cedar two miles south of the Kitimat Dock. Four other collections, made at widely separated points throughout the district, contained one larva each.

Spruce Aphid, <u>Neomyzaphis abietina</u> (Wlkr.)

Areas of Sitka spruce suspected of being attacked by spruce aphid were observed during an aerial survey in 1961 near the lower end of Owikeno Lake and extended to Kilbella Bay on Rivers Inlet. Other similar areas were noted at Ocean Falls, Dean Channel, Fraser Reach and Grenville Channel. Examination in the same areas in 1962 showed no further defoliation, and it is presumed that the infestation has for the present collapsed.

Spruce Tip Moth, <u>Zeiraphera</u> spp.

Feeding on the current foliage of Sitka spruce by spruce tip moth continued in most sections of the district surveyed in 1962. However attacks were generally lighter than in 1961. The only location where the intensity of attack remained approximately the same was in the Douglas Channel area where 70 to 80 per cent of the lateral buds showed evidence of feeding. As the larval period of this insect is very early only four larvae were collected in three samples from Sitka spruce.

Sawflies, <u>Neodiprion</u> spp.

The number of sawfly larvae found in 1962 increased considerably over that of the previous year. Three hundred and thirty-one larvae were collected from western hemlock on the east side of Johnson Channel near Ocean Falls. At another sampling point, one mile north of Bish Creek on Douglas Channel, 287 larvae were found on Sitka spruce. A total of 37 collections made on western hemlock averaged 26.1 larvae per sample. Twenty-two collections from Sitka spruce averaged 19.5 larvae. In 1961, 10 collections on western hemlock averaged 4.4 larvae and 11 collections from Sitka spruce averaged 12.9. The largest single collections made in 1961 contained 83 sawfly larvae.

Alder Bark Beetle, <u>Alniphagus aspericollis</u> (Lec.)

In 1961 one alder tree was found infested by alder bark beetle near the entrance to Kildala Arm, on Douglas Channel. This year when examinations were made in the same location two additional trees were found to be infested. The attacks, as in the previous year, were heavy, up to 25 per square foot and extended from the base of the trunk to the crown, a distance of 40 to 50 feet.

OTHER NOTEWORTHY INSECTS

South Prince Rupert District, 1962.

Insect	Host (s)	No. of Collections	Remarks
Adelges cooleyi Gill.	S	-	Present in most areas.
Anthelia hyperborea Hulst	H	6	Collections small, prevalent in widely separated sections of district.
Caripeta divisata Wlk.	C, S, H	4	Two larvae per collection.
Gabriola dyari Tayl.	H, S	4	One larva per collection.
Hydriomena irata Swett	H, S	11	Collections averaged 1.4 larvae per sample.
Lambdina fiscellaria lugubrosa (Hlst.)	H	3	Low level.
Nyctobia limitaria Wlk.	S, H	18	Collections averaged 1.6 larvae per sample.
Pikonema dimmockii Cress.	S, H	13	Eleven collections made on Sitka spruce, two on western hemlock, two larvae per sample.

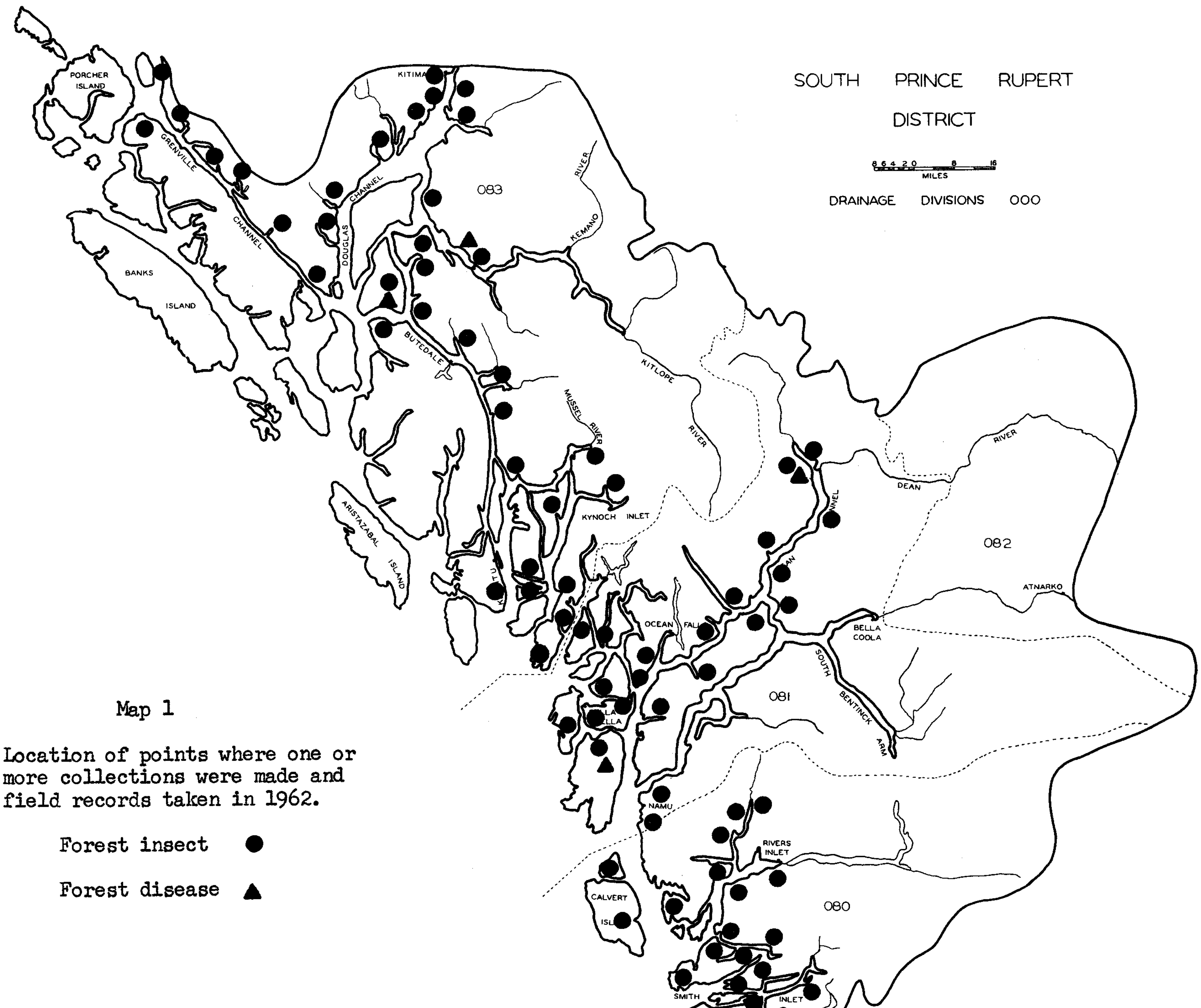
STATUS OF TREE DISEASES

Drought killed trees

During the survey of Rivers Inlet and Dean Channel, patches of dead trees were observed in many locations along the shoreline and hillsides. The dead trees were most prevalent on terrain that was steep and rocky and where the soil was shallow. Most of the trees were immature western hemlock and western red cedar. Examination of a number of these areas was not possible due to the steepness of the shoreline. However the ones that were examined showed no evidence of the trees having been killed by insects or disease. It is therefore assumed that the unusually hot weather which prevailed in the summer of 1961, could have caused the trees to die of drought.

Possible Fume Injury

Dead and dying trees which have possibly been injured from industrial fumes or suffered some physiological damage, were found at the eastern end of Cousin's Inlet at Ocean Falls. It was later observed that the trees formed a belt approximately 300 yards wide, extended in a south easterly direction towards Dean Channel, a distance of about four miles. Due to the topography of the surrounding terrain, prevailing winds would tend to carry fume clouds from a nearby industrial plant in that direction.



Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲

FOREST INSECT AND DISEASE SURVEY

WEST PRINCE RUPERT DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

WEST PRINCE RUPERT DISTRICT

1962

E. G. Harvey

INTRODUCTION

Rainy and unsettled weather prevailed throughout much of the summer of 1962. This delayed the development of insects in the spring and early summer and resulted in insects which are normally collected early in the season occurring in collections which usually contained "fall" insects.

Field work started on May 14, and regular sampling continued until August 31. Appraisal surveys were made up to October 18.

Several mass collections were made during the summer. Approximately 2,500 spruce budworm larvae were collected, most of which were forwarded to Dr. Smith at Sault Ste. Marie. Approximately 1,000 saddle-backed looper and 200 grey forest looper larvae were also collected. These two mass collections were difficult to get, due to the decline in populations of these species.

A total of 424 insect and 68 forest disease collections were made. The distribution of collections by hosts is shown in Table 1 and the locations of the collections is shown in Maps 1 and 2.

STATUS OF INSECTS

Black-headed Budworm, *Acleris variana* (Fern.)

The first black-headed budworm larva was found in the Prince Rupert District on June 22nd and the last on August 31st. Of 243 collections made from the major host trees within this date range, 45 contained an average of 12.2 larvae per sample.

Black-headed budworm populations decreased in all drainages in 1962 with the exception of 105 (Table 2). The relatively large figures for drainage 105 reflected the high budworm population found in the Zymoetz River Valley. Up to 236 larvae per 3-tree beating sample were collected here. However, very little defoliation was observed. Egg counts made at five localities within the areas of high larval populations, indicate a low population in 1963 (Table 3). This is based on the rating that from one to seven eggs per 10-inch tip represents light defoliation.

Table 1

Collections by Hosts

West Prince Rupert District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, red	21	1	Alder, red	8	1
Fir, alpine	3		Alder, Sitka		2
Fir, amabilis	42	9	Apple	1	
Hemlock, western	136	7	Aspen, trembling	26	1
Hemlock, mountain	1		Aspen, large-tooth	1	
Pine, lodgepole	8	1	Birch	5	
Pine, ponderosa	1	1	Chokecherry, western	1	1
Spruce, Engelmann	1		Dogwood, red Osier	1	
Spruce, white	1		Maple, Douglas		1
Spruce, Sitka	113	4	Poplar spp.	3	25
Yew, western	1		Willow	22	4
			Miscellaneous	19	4
			No host	9	
Total	328	23	Total	96	39
			GRAND TOTAL	424	62

Table 2

Summary of Black-headed Budworm Collections by Drainage Divisions

West Prince Rupert District.

Drainage division	Total number of samples taken during larval period			Percentage of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
100	56	20	54	67.8	20.0	0	71.1	8.0	-
101	51	21	17	58.8	28.6	11.8	16.9	12.0	4.5
102	29	32	19	17.2	56.2	0	4.8	23.5	-
103	22	5	20	72.7	40.0	15.0	39.9	32.5	1.8
104	24	25	42	0	28.0	11.9	-	2.7	2.4
105	23	32	49	0	40.6	16.3	-	6.7	40.6
106	44	5	42	43.1	20.0	65.2	20.3	1.0	7.2
Total	249	140	243	43.4	35.7	18.5	39.4	13.9	12.2

Table 3

Black-headed Budworm Egg Counts, Zymoetz River Valley,

West Prince Rupert District, 1962.

Location of points sampled (Mileages from Highway 16)	Average number of eggs from 15 10-inch tips
2.5	.33
5	.53
8	.47
10	.07
12	.13
Over-all average	.31

Saddle-backed Looper, Ectropis crepuscularia Schiff.

The saddle-backed looper infestation in the Kitimat area declined to a very low level in 1962. Larvae were scarce throughout most of the heavily infested area which was sprayed in 1960 and 1961. A relatively large population existed in the spring of 1962 from the smelter site nearly to Bish Creek. A total of 28 samples collected in the infestation area averaged 16 larvae each. The largest collection, from western red cedar, and taken from Kitimat Arm, contained 113 larvae.

A pupal survey was carried out for the third consecutive year in mid-September 1962. Samples consisted of two one-foot-square duff samples taken at a point mid-way between the base of the tree and the edge of the crown projection on the east and west side of each of three trees in each locality. No pupae were found in a total of 29 points sampled in 1962 (Table 4). The numbers refer to locality numbers established in 1961 when sampling was more intensive. (see Map 5 in 1961 report).

Tabel 4

Location of Sample Points and Numbers of Saddle-backed Looper Pupae and Dusona pilosa (Walley) Cocoons per Square Foot of Duff at Each Locality West Prince Rupert District.

Point No.	Location	Av. no. pupae per sq. ft. of duff			No. D. pilosa cocoons		
		1960	1961	1962	1960	1961	1962
1	Emslie Cove	-	0	0	-	0	0
2	Emslie Creek	-	0	0	-	0	0
3	Bish Creek	-	0	0	-	0	0
5	Kitimat Arm	-	9.0	0	-	52	2
6	Kitimat Arm Blk 89	4.3	0.17	0	0	54	4
7	Moore Creek	12.1	0	0	0	1	0
9	E. Sneltersite Blk 89	-	1.2	0	-	8	1
11	N. Anderson Creek	12.3	0	0	0	0	1
12	Power line N-east side	-	0	0	-	0	0
13	Power line N-west side	-	0	0	-	0	0
14	1/2 mi. N. Anderson Creek	4.3	0	0	0	1	0
15	W Kitimat River Blk 6053	16.2	0	0	0	0	0

Table 4 - continued

Point No.	Location	Av. no. pupae per sq. ft. of duff 1960	1961	1962	No. D. pilosa cocoons 1960	1961	1962
17	Sand Hill	11.9	0	0	0	0	0
19	Radley Park	6.0	0	0	0	0	0
20	Service Centre	10.3	0.094	0	0	182	1
21	Claque Mt. trail, base	-	0	0	-	0	0
22	" " " 800'	5.0	0	0	0	0	0
23	" " " 1,600'	3.7	0	0	0	0	0
25	Blk 6071 -RR W side	0.2	0.83	0	0	6	1
31	Blk 6046 Kitimat	0.8	0	0	0	0	0
32	Blk 307 Kitimat	0	0	0	0	0	0
33	Blk 6013 Power line Rd	0	0	0	0	0	0
34	Blk 6021 Minette Bay	0	0	0	0	0	0
35	Blk 308 Minette Bay	0	0	0	0	0	0
36	Blk 6016 Kitimat River	0	0.34	0	0	0	0
37	Blk 6154 Hirsch Creek	0	0	0	0	0	0
46	Nalbeelah Creek	0	0	0	0	1	0
50	Mile 30 RR Wedeene River	-	0	0	-	0	0
55	Mile 26 RR Wedeene River	0	0.17	0	0	0	0

As shown in Table 4, 10 Dusona pilosa (Walley) parasite cocoons were found, even though there were no looper pupae in 1962. Most of these were collected in the same areas as in 1961, and at points where the larval population was heaviest during the summer. It is believed that this parasite species was a major factor in controlling the outbreak.

Another control factor was a Polyhedral virus disease. While making a mass collection of 1,000 mid-instar larvae, approximately 20, or two per cent were found dead as a result of this disease. Last instar larvae killed by virus were very conspicuous in 1961; it is therefore believed that virus, which was evident in third and fourth instar larvae in 1962, played a leading role in controlling the outbreak.

Stand condition

Heavily defoliated areas of the infestation were outlined on May 5 in the 1961 report. Heavy tree mortality has occurred within this area to date. Many trees which have survived so far have been seriously weakened. Spruce budworm, spruce tip moths, various loopers, and sawfly larvae are all feeding on the new foliage these trees are producing, and bark beetles are attacking the weakened trees. Ground cover, including understory and seedling trees, is mostly dead. Study plots show that 52.7 per cent of the trees have died so far.

In 1959 plots were established throughout the Kitimat area to study the effect of the smelter fumes on the trees. Several of these were within the outlined area. The progressive tree mortality in the plots is shown in Table 5.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Spruce budworm populations remained at a low level in all portions of the West Prince Rupert District in 1962, with the exception of drainage 102. No spruce budworm larvae were collected in the Queen Charlotte Islands (drainages 100 and 101). The high occurrence and large numbers of larvae per collection in drainage 102, where 75 per cent of the collections made during the larval period contained an average of 56 larvae (Table 6), was a result of the spruce budworm outbreak in a portion of the drainage.

The outbreak, centred around Kitimat, extends through the same area as the recent outbreak of saddle-backed looper. It extends from the Wedeene River, to the north of Kitimat, for a distance of approximately 18 miles south to Emslie Cove, on the west side of Kitimat Arm. Part of this area is in drainage 083 in the South Prince Rupert District, but the infestation as a whole is dealt with in this report.

The occurrence and abundance of spruce budworm larvae were much greater on amabilis fir, the preferred host, than on spruce or hemlock (Table 7). The largest population was in the vicinity of Kitimat where three beating collections from amabilis fir averaged 178 larvae each.

Spruce budworm defoliation estimates were made in conjunction with saddle-backed looper pupal surveys, at those points which fell within the infested area, or its perimeter (Table 8). Defoliation estimates were made on ten amabilis fir trees, picked at random, at each point. The points are numbered as for the saddle-backed looper.

Heaviest defoliation occurred between Anderson Creek and a point approximately one mile north of Service Centre, where up to 100 per cent of the current year's foliage was lost. This is also the area which has suffered the heaviest accumulative defoliation; over half the total foliage complement has been lost in the past three years.

Table 5

Accumulative Tree Mortality in Saddle-backed Looper Plots

West Prince Rupert District.

Location	Tree species	No. of trees	Dead 1960	Dead 1961	Dead 1962
Fume plot no. 2 Anderson Creek	H	22	8	16	19
	B	31	8	24	26
	C	8	1	4	4
	Total	61	17	44	49
Fume plot no. 3 Sandhill	H	122	9	48	50
	B	13	0	5	7
	C	1	0	1	1
	Pl	1	0	0	0
	Total	137	9	54	58
Fume plot no. 4 1/4 mi. N. Kitimat station	H	10	0	1	1
	B	20	1	1	2
	Total	30	1	2	3
Mortality plot no. 1 Sandhill	H	29	0	16	18
	B	4	0	4	4
	Total	33	0	20	22
Mortality plot no. 2 Sandhill	H	30	0	14	16
	B	17	0	3	15
	C	3	0	1	1
	Total	50	0	18	32
Grand Total		311	27	138	164

Spruce budworm egg counts were made at 15 sample points. The average number of egg masses per square foot of foliage surface decreased in the older portion of the outbreak at Service Centre and in Block 6071, but were still greater than in the other areas sampled (Table 8). Based on these data light to medium defoliation can be expected throughout the same area in 1963, with the heaviest feeding again concentrated from Anderson Creek to Service Centre.

Table 6

Summary of Spruce Budworm Found by Drainage Divisions

West Prince Rupert District.

Drainage division	Total number of samples taken during larval period			Percentage of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
100	55	19	51	0	0	0	-	-	-
101	50	21	17	0	0	0	-	-	-
102	32	29	20	21.8	62.1	75.0	25.0	53.1	56.3
103	22	3	22	18.1	33.3	18.2	1.0	1.0	1.6
104	33	5	25	3.0	20.0	32.0	1.0	3.5	1.9
105	29	12	18	20.7	50.0	33.3	1.8	2.2	3.7
106	46	4	33	15.2	50.0	9.1	1.4	1.0	5.7
Total	267	93	186	9.4	30.1	19.4	8.0	34.9	25.2

Table 7

Summary of Spruce Budworm Found by Host Trees

West Prince Rupert District

Host trees	Total number of samples taken during larval period			Percentage of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
H	159	55	90	4.4	20.0	10.0	1.4	5.2	3.9
S	72	17	71	12.5	11.8	19.7	1.6	25.5	19.3
B	21	15	21	23.8	86.6	61.9	34.1	66.5	46.2
Ba	10	0	2	40.0	-	0	1.6	-	-
Pl	5	4	2	0	0	0	-	-	-
Total	267	91	186	9.4	28.6	19.4	8.0	37.4	25.2

Spruce Terminal Damage

Spruce terminal damage to regeneration on the Queen Charlotte Islands has, up to 1962, been attributed to several species of Zeiraphera. More detailed studies in 1962 revealed that the damage was caused by a complex of insects.

The terminal damage can be classified into two main types; 1) the leader bud is killed before growth starts in the spring and 2) the leader is attacked after growth has started.

The most common damage is the killing of the bud. This is caused by two very dis-similar insects; 1) larvae of a midge, Rhabdophaga sp., which mine and kill the terminal bud before it flushes in the spring, and 2) a lepidopterous larva, identified by Dr. T. N. Freeman of Ottawa as Epinotia sp., which also mines and kills the bud before growth starts. Buds killed by these two species can be separated only by close examination.

Larvae, identified as Zeiraphera sp. nr. ratzeburgiana, attacks the leader after growth has started. They feed on needles at first, later mining into the leader itself, causing it to wilt and die. Zeiraphera sp. larvae also attack lateral branches, but the damage is confined to defoliation of current foliage.

Table 8

Location of Sample Points where Spruce Budworm Defoliation Estimates and Egg Counts were made on Amabilis Fir, Kitimat Area.

Point no.	Location	Egg masses per sq. ft. 1961	Egg masses per sq. ft. 1962	Av. no. eggs per mass 1962	Per cent defoliation current	Per cent defoliation total
1	Emslie, South	-	71	34.6	60	17
2	Emslie Cove	-	0	-	T*	0
3	Bish Creek	9	25	37.2	65	23
5	Kitimat Arm	-	6	20.0	45	16
6	Kitimat Arm Blk 89				24	10
9	E. of Smelter site				85	20
11	Anderson Creek	22	0	-	75	33
12	Power line - E side				76	20
13	Power line - W side				75	15
14	1/2 mi. N. Anderson Creek				100	55
16	S. of Sandhill	21	16	30.1		
19	Radley Park				78	28
20	Service Centre	356	132	34.6	100	55
21	Claque Mt. trail base	-	39	43.9	66	33
22	Claque Mt. trail, 800'				14	21
23	Claque Mt. trail, 1,600'				36	41
25	Kitimat, Blk 6071	133	80	38.8	97	52
34	Minette Bay	-	3	14.0	T	T
37	Hirsch Creek	-	0	-	0	T
46	Nalbeelah Creek	6	3	7.0	0	T
50	Mile 30 -R.R.	15	31	30.2	5	15
	Beam Stn. Rd.	-	0	-		
	Dasque Creek	-	0	-		

* T = trace

Observations on trees in four plots established in 1960 shows that recurrent attacks have taken place for several years (Table 9). Some trees have been attacked up to four times since they reached a height of about three feet. It will be noted that the total number of leaders or leader buds which have been killed to date greatly exceeds the total number of trees in the plots. However, 67 per cent of the trees in the plots still have single, unattacked leaders. A few trees have multiple leaders, but in most cases one of the top laterals takes over to form a new leader. In young trees the slight deformity thus caused is soon unnoticeable. Some trees which suffered repeated leader damage have become stunted or bushy in appearance, and may be of no value as a timber tree if attacks continue.

The number of terminals killed by all insects is shown in Table 9. Leaders which were attacked or lightly defoliated, but did not die, are not included.

Heavy feeding by Zeiraphera sp. larvae on current foliage of Sitka spruce was found in the Kitimat area, where three collections averaged 40 larvae each. One collection at Williams Creek contained 26 larvae, but defoliation was light. Elsewhere Zeiraphera spp. were scarce.

Outside of the Queen Charlotte Islands Rhabdophaga sp. were found only in the Kallum nursery at Terrace where a total of 38 galls was found on young Sitka spruce trees averaging about two feet in height.

Table 9

Summary of Sitka Spruce Leaders Killed by Epinotia sp., Zeiraphera spp., and Rhabdophaga sp., Queen Charlotte Island Plots.

Plot no.	Location	Total no. of trees	No. of leader terminals killed by insects				Totals	No. of single unattacked leaders
			before 1960	1960	1961	1962		
1	East Narrows	58	71	5	8	12	96	44
2	Sandspit	77	79	18	20	18	135	42
3	Skidegate Lake	40	42	5	5	5	57	35
4	Maude Island	49	34	1	5	16	56	29
	Total	224	226	29	38	51	344	150

Green Spruce Looper, Semiothisa sp.

This looper was formerly Semiothisa granitata Gn., but recent taxonomic studies have resulted in the specific name being dropped.

Green spruce looper larvae were found in 52 collections distributed throughout the mainland portion of the West Prince Rupert District, (Map 4). As shown below the number of collections containing larvae increased in 1962, but the average number of larvae per collection decreased slightly.

Year	No. collections containing larvae	Av. no. larvae per collection
1960	12	3.2
1961	42	10.6
1962	52	9.4

The largest populations in 1962 were in the Zymoetz River Valley where up to 51 larvae were collected in samples in association with large numbers of grey forest looper.

Grey Forest Looper, Caripeta divisata Wlk.

This looper occurred, in small numbers, from the Zymoetz River to the Portland Canal, (Map 4). The average number of larvae for 29 collections was 6.8.

The infestation in the Zymoetz River Valley declined in intensity in 1962; defoliation was negligible. The largest collection made in the valley contained 66 larvae. In 1961 collections in the infested area ranged from 40 to well over 200. A pupal survey was made in October. At each of four points three trees were picked at random and two duff samples taken from each of the east and west sides - one from the base of the tree and one from a point half way between the base and the crown perimeter. The four points sampled were 2.5, five, eight, and 10 miles from Highway 16. Only five pupae were found in the 48 square feet of duff examined, and only three of these were of the grey forest looper.

A light population will be present in the area in 1963.

Western Winter Moth, Erannis vancouverensis Hulst

A localized infestation of this looper on maple and other deciduous trees was reported in 1961 on the south side of the Skeena River opposite the town of Terrace. No defoliation was observed in 1962, but a light moth flight in October indicated that some larvae had been present. The flight was not nearly as intense as in 1961, but up to 40 or 50 moths were counted on store fronts in Terrace on October 17, apparently attracted by lights during the night.

Green Spruce Aphid, Neomyzaphis abietina (Wlkr.)

The green spruce aphid infestation which caused severe defoliation of Sitka spruce in the area around Prince Rupert and in much of the Queen Charlotte Islands in 1961 decreased in intensity in 1962. The infestation mapped from the air in 1961, and based on visible defoliation, is now known to extend as far south as Jedway on Moresby Island. The insects were still active at Burnaby Narrows in July.

Defoliation in 1962 varied from light to medium. In some areas the needles attacked in 1961 turned brown and were still on the twigs in July, 1962. This condition was particularly noticeable between Sandspit and Alliford Bay. Probably the needle drop would have been much heavier if the summer had been hotter and drier.

Early in 1962 the British Columbia Forest Service reported heavy defoliation and dead timber in a spruce stand about two miles up the Khutzeymateen River from the head of the inlet. A reconnaissance flight over this area on June 11 indicated that spruce was the only host affected. Damage at this time was observed only by defoliation. Ground observations on trees at the head of the inlet at a later date indicated that the green spruce aphid was responsible.

The dead timber in the area was attributed to flooding caused by beaver dams.

A Gall Aphid, Pineus similis Gillette

This aphid was observed in several localities in 1962. Several young Sitka spruce trees in the Kallum nursery at Terrace were lightly infested. One tree, about two feet in height, was very heavily infested, with galls on nearly all the new growth.

Groups of seedlings and trees under two feet in height were infested throughout the Queen Charlotte Islands. In one area, near Skidegate Lake, galls were found on trees up to six inches in diameter, but no trees of this size were heavily infested.

Aspen Leaf Miner, Phyllocnistis populiella Chamb.

The aspen leaf miner was prevalent in all aspen stands in the district in 1962.

Pure stands of aspen extending from Cedarvale east to Hazelton, and into the East Prince Rupert District, have been completely defoliated for several consecutive years by the forest tent caterpillar, making a study of the leaf miner impossible. Plots were therefore established to the west and south of Cedarvale in areas where aspen appear in scattered groves.

Four plots were located near Cedarvale, Oliver Creek, Terrace, and on the Beam Station Road, near the Terrace airport. Ninety to 100 per cent of the leaves in all four plots were mined (Table 10).

Table 10

Aspen Leaf Surfaces Mined and Number of Cocoons

Produced per Leaf Surface. West Prince Rupert, 1962.

Plot location	Total no. of leaves	Percentage of leaves mined	Percentage of leaf surfaces mined	Av. no. cocoons per surface
Cedarvale	673	97.8	91.2	1.03
Oliver Creek	385	99.5	96.2	0.88
Terrace	488	100.0	97.9	1.10
Beam Station Road	455	89.9	73.6	1.02

Mortality from parasitism exceeded 50 per cent at Cedarvale and Oliver Creek, and was lowest at the Beam Station Road Plot. The percentage of adult emergence was high, particularly near Terrace (Table 11). The outbreak is expected to continue in 1963.

In one area, at Spencer Lake, near the Nass River, the trees were infested in about equal numbers by another leaf miner, Lithocolletis populiella Chamb.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Aspen trees in the Skeena River Valley from Cedarvale east to Hazelton, and in the Kitwanga River Valley, north to Kitwanga Lake were severely defoliated by the forest tent caterpillar in 1962 (Map 5). The outbreak extended eastward into the East Prince Rupert District (see report for that district).

Aspen was the favored host, but all deciduous trees and shrubs were defoliated. Sitka spruce trees were also attacked where growing in association with aspen. In many cases the top two or three feet of the tree and the tips of the lateral branches were completely defoliated. Egg counts were made at four localities, using the sequential sampling method. Based on these samples heavy defoliation is expected to occur throughout the same areas in 1963 (Table 12).

Table 11

Mortality of Aspen Leaf Miner in 100-Cocoon Samples at

Four Localities West Prince Rupert, 1962.

Location	Per cent emerged	Per cent parasitized	Per cent dead
Cedarvale	33	52	15
Oliver Creek	37	52	11
Terrace	45	43	12
Beam Station Road	68	17	15
Average	45.8	41	13.2

Table 12

Numbers of Forest Tent Caterpillar Egg Masses in

Four Localities - West Prince Rupert, 1962.

Location	No. of trees sampled	Total no. of egg masses	Predicted defoliation
Hazelton - Kitwanga Road	1	11	Heavy
Kitwancool Road	2	21	Heavy
Skeena Crossing	11	34	Heavy
East of Cedarvale	2	21	Heavy

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Hemlock looper populations remained low for the third consecutive year. Only four per cent of the collections made during the larval period contained larvae (Table 13).

Table 13

Summary of Hemlock Looper found by Drainage Divisions

West Prince Rupert District.

Drainage divisions	Total number of samples taken during larval period			Percentage of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
100	52	20	54	0	0	0	-	-	-
101	49	20	17	0	0	0	-	-	-
102	30	26	2	10.0	0	0	1.0	-	-
103	23	1	16	4.3	0	0	1.0	-	-
104	10	10	9	0	0	22.2	-	-	2.2
105	4	17	17	25.0	35.3	11.8	3.5	3.0	2.2
106	45	5	36	4.4	20.0	5.6	2.3	1.0	1.0
Total	213	99	151	3.3	7.1	4.0	1.7	2.7	1.8

Balsam Bark Beetles, *Pseudohylesinus* spp.

Amabilis fir trees in the saddle-backed looper outbreak area at Kitimat and north to the Skeena River are being heavily attacked by two species of bark beetles, *Pseudohylesinus grandis* Swaine, and *P. nebulosus* Lec.

Groups of trees selected at random in stands with a high percentage of balsam were examined in September, 1962. All balsam trees in the groups were tallied as dead, bark beetles present, or not attacked (Table 14). The only dead trees listed were those recently killed by bark beetles. Trees ranged in size from three to 48 inches in diameter, but the majority were of merchantable size. Every tree which showed evidence of beetles, that is, entrance holes and boring dust, was listed as having beetles present. Many of the trees contained beetles only around the root collar. As these beetles are known to over-winter in the bark of the tree without penetrating the cambium, the number of trees containing beetles is not indicative of the number of trees which will be actually attacked in the spring of 1963.

Pitch tubes caused by the fir bark maggot, *Chilosia hoodiana* (Bigot) were common on the trees throughout the region. With one exception bark maggots were observed only on trees containing bark beetles.

Table 14

Balsam Bark Beetle Tally in the Kitimat - Terrace Area

West Prince Rupert - Septmeber, 1962.

Location	Total no. trees	No. of trees dead	No. of trees containing beetles	No. of trees free of attack
Beam Station Road	20	0	10	10
Dasque Creek	20	0	18	2
Zymoetz River				
Mile 2.5	16	0	13	3
Mile 3.5	46	0	41	5
Mile 5	10	3	5	2
Mile 8	10	0	7	3
Mile 10	44	0	38	6
Mile 12	10	0	6	4
Kitimat				
sample point 16	29	1	28	0
Bravo's	18	1	17	0
North of Station	52	0	45	7
Total	275	5	228	42

A Plantation Weevil, Steremnius carinatus (Boheman)

This weevil was first reported causing damage to Douglas fir plantation stock on Vancouver Island in 1961. It was found causing damage in the Queen Charlotte Islands in 1962. The heaviest damage observed was south of Juskatla Inlet on Graham Island. The areas had been logged and burned in 1960, and natural regeneration became established. Examination in mid-July, 1962, showed that up to an estimated 75 per cent of the young seedlings had been girdled and killed in areas totalling an estimated 200 acres. Adult weevils were still very active. Seedlings of spruce, hemlock and cedar were attacked, as well as all huckleberry bushes examined in the area.

The weevil is also present on Moresby Island. Some settings north of Moresby Camp which were logged two years ago, and reportedly had regeneration established, were found to be very poorly stocked. Traps set out by foresters of Rayonier Canada (B. C.) Limited showed that the weevil is general throughout the area.

Only one adult weevil was found on the mainland portion of the district, in a duff sample at Kitimat in September.

Green-striped Forest Looper, Melanolophia imitata Wlk.

The occurrence and abundance of green-striped forest looper in the West Prince Rupert District increased slightly in 1962 (Table 15). The largest number, 43 larvae, was collected in the Zymoetz River Valley in association with the grey forest looper and black-headed budworm. Other samples containing above average numbers were collected at Tlell (12 larvae) and Juskatla (19 larvae) in the Queen Charlotte Islands, and in the Nass River Valley (16 larvae). The populations present in 1962 were too small to create a hazard.

Table 15

Summary of Green-striped Forest Looper found by Drainage Divisions

West Prince Rupert District.

Drainage division	Total number of samples taken during larval period			Percentage of samples containing larvae			Average number of larvae per sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
100	46	20	54	23.9	20.0	7.4	3.6	3.5	1.0
101	47	20	17	8.5	0	35.3	1.6	-	8.4
102	29	10	2	10.3	40.0	50.0	6.5	2.9	1.0
103	16	3	16	25.0	33.3	12.5	4.6	1.0	5.7
104	10	17	14	20.5	41.2	14.3	2.3	2.7	1.0
105	3	18	23	66.7	27.8	21.7	2.3	9.2	11.8
106	28	5	33	10.7	40.0	18.2	1.8	2.2	6.1
Total	179	93	159	16.2	24.7	26.0	3.4	4.2	6.3

OTHER NOTEWORTHY INSECTS

Insect	Hosts	No. of collections	Remarks
Altica tombacina Mann	Cot, W, D, Red osier dogwood	8	Localized outbreak at Exstew
Acantholyda spp.	H, S, B	20	Av. 1.6 larvae per collection
Archips cerasivoranus (Fitch)	Chokecherry	1	Several bushes infested at Kitwanga
Calligrapha verricosa Suffrian	W	3	Heavy defoliation at Shames and Zymoetz River
Chrysomela a. littorea Brown	Cot, Pop, B, W, Bi, D, H	11	Commmon, but no heavy defoliation
Chrysomela scripta (Fab.)	Cot, Pop, W, Pl	6	Light attacks on exotic poplars.
Dioryctria sp.	S, Sw	4	Cones infested Hazelton to Kitwanga
Gabriola dyari Tayl.	S, H, B, Pl	28	Average 1.3 larvae per collection
Hemichroa crocea (Fourc.)	D	2	Found only at Prince Rupert and Alliford Bay
Laspeyresia youngana Kft.	S, Sw	2	Cones infested from Hazelton to Kitwanga
Neodiprion spp.	H, B, S, Ba, Pl	104	Av. 9.8 larvae per collection. Very common and widespread
Nyctobia limitaria Wlk.	H, S, D	25	Common. Av. 2 larvae per collection
Orgyia a. badia (Hy. Ed.)	S, B, H, D, W	10	Av. 2.7 larvae per collection.
Pikonema alaskensis Roh.	S	27	Widespread. Av. 4.9 larvae per collection.
Pikonema dimmockii Cress.	S, H	48	Common. Av. 4.2 larvae per collection
Pissodes engelmanni Hopk.	Sw	1	Localized infestation north of Kitwanga

OTHER NOTEWORTHY INSECTS - continued

Insect	Hosts	No. of collections	Remarks
Pissodes sitchensis Hopk.	S	3	Found at Remo, Spencer Lake and Skeena Crossing
Sternochetus lapathi (L.)	W, Cot	4	Localized at Terrace
Syngrapha spp.	H, B, S, Hm	22	Widespread. 32 larvae found.
Zotheca t. viridula Grt.	elderberry	2	Heavy infestation from Remo to Dasque Creek

STATUS OF FOREST DISEASES

Important Diseases

A Canker Disease of Poplars

A canker disease apparently caused by a fungus identified as *Cryptosporium* sp., was found to be prevalent in hybrid and exotic poplars in the Kallum nursery at Terrace. Native poplars growing in the same area were not found to be infected. Only young trees and stools over two years of age were affected.

The older trees were planted out in open rows, some of them in well cultivated nursery beds, and others in an adjacent logged area growing in competition with young native shrubs and trees. Trees in both these planted situations became infected with approximately ten per cent having cankers on the main stem and many of them killed. Branch cankers were also common.

Rodent Damage to Poplar Plantations.

In most poplar plantations in the district a few of the trees show evidence of rodent damage. In one area, on the south side of the Skeena River from Shames these experimental plots are fairly extensive, containing many exotic and hybrid poplars. The trees in these plots were found to have been severely damaged by mice and voles. Approximately 95 per cent of the trees were girdled, mostly from ground level to a height of four or five feet. Some of the smaller ones were stripped of bark right out onto the branches.

Some of these trees have started to send up new shoots from ground level and could possibly survive, but for the most part this plantation has been totally destroyed.

Sweetfern Blister Rust

One small ponderosa pine in a plantation near Kalum Lake, north of Terrace, was found to be infected with a blister rust. The rust tentatively identified as the sweetfern blister rust, caused by Cronartium comptoniae Arth., controlled infection of the alternate host Myrica gale L. This was the first record of the rust on ponderosa pine in B. C.

A Canker and Die-back on Willow

Willow bushes at the side of the road between Kitwanga ferry and Skeena Crossing were found to be suffering from a canker and die-back disease. The causal agent was identified at Pleospora sp., a new record on this host. Also found in conjunction with this canker was another fungus Helminthosporium, not previously reported on the host.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Fir, amabilis	Herpotrichia nigra Hartig	Kitimat	Brown felt blight common in area.
	Dasyscyphus agassizii (Berk. & Curt.) Sacc.	Kitimat	On dying twigs, probably saprophytic.
Chokecherry	Dibotryon morbosum (Schw.) Theiss. & Syd.	Kitwanga	Branch cankers, common in area.
Cottonwood, black	Melampsora occidentalis Jacks.	Terrace	Only a few rusted leaves found.
Hemlock, western	Echinodontium tinctorium Ellis & Everh.	Lakelse Lake Kitimat	Decay fungus. Many trees in area have conks.
	Arceuthobium campylopodum Engelm.	Kitimat Alice Arm	Dwarf mistletoe. Many witches brooms throughout the area.
Pine, lodgepole	Peridermium harknessii J. P. Moore	Prince Rupert	Gall rust. Heavy attack on swampy sites Common elsewhere.
Spruce, Sitka	Chrysomyxa pirolata Wint.	Kitwanga Hazelton	Spruce needle rust. Light infection. Approx. 50% of cones rusted.

WEST PRINCE RUPERT DISTRICT (MAINLAND)

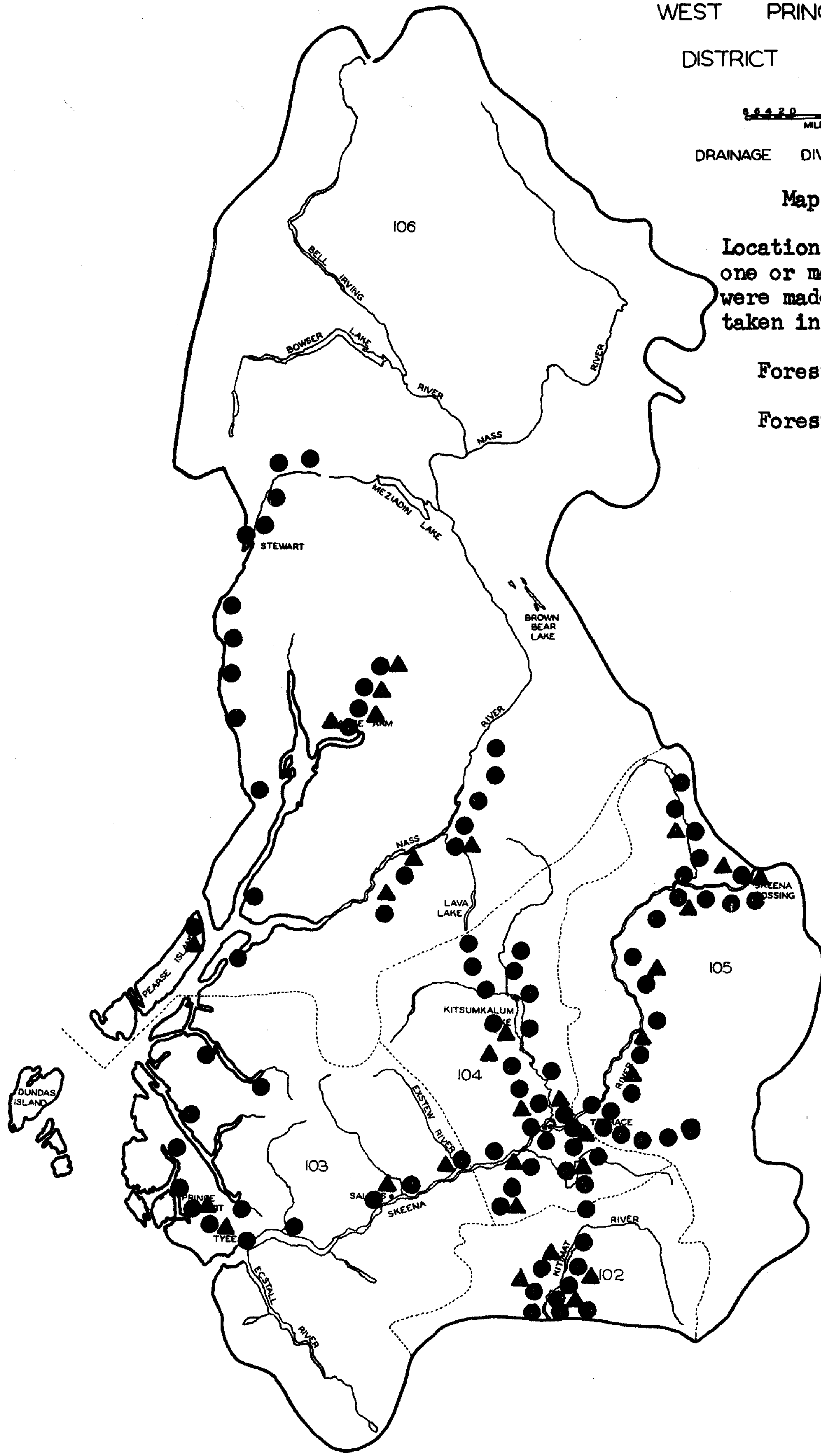
DRAINAGE DIVISIONS 000

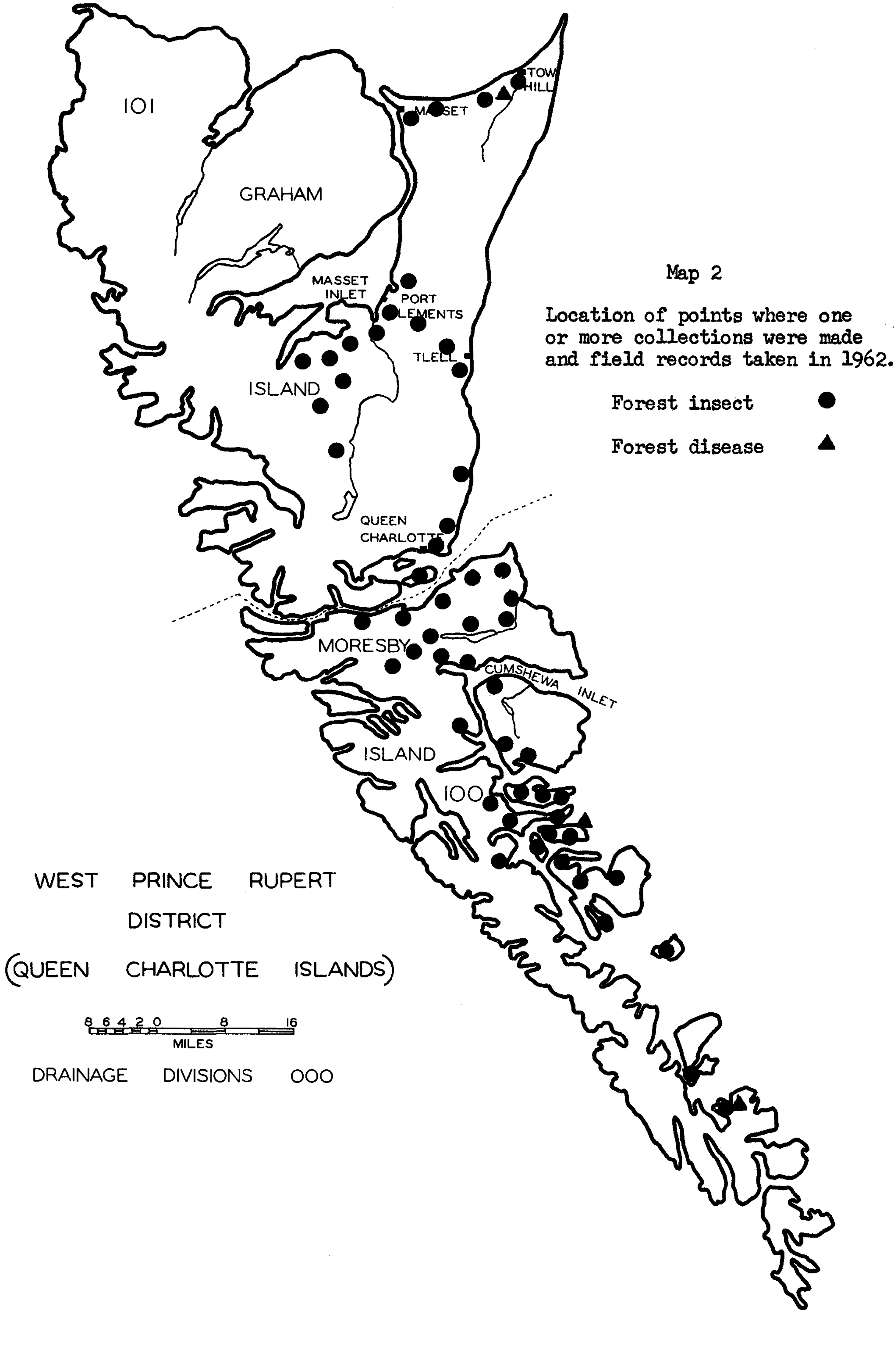
Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲



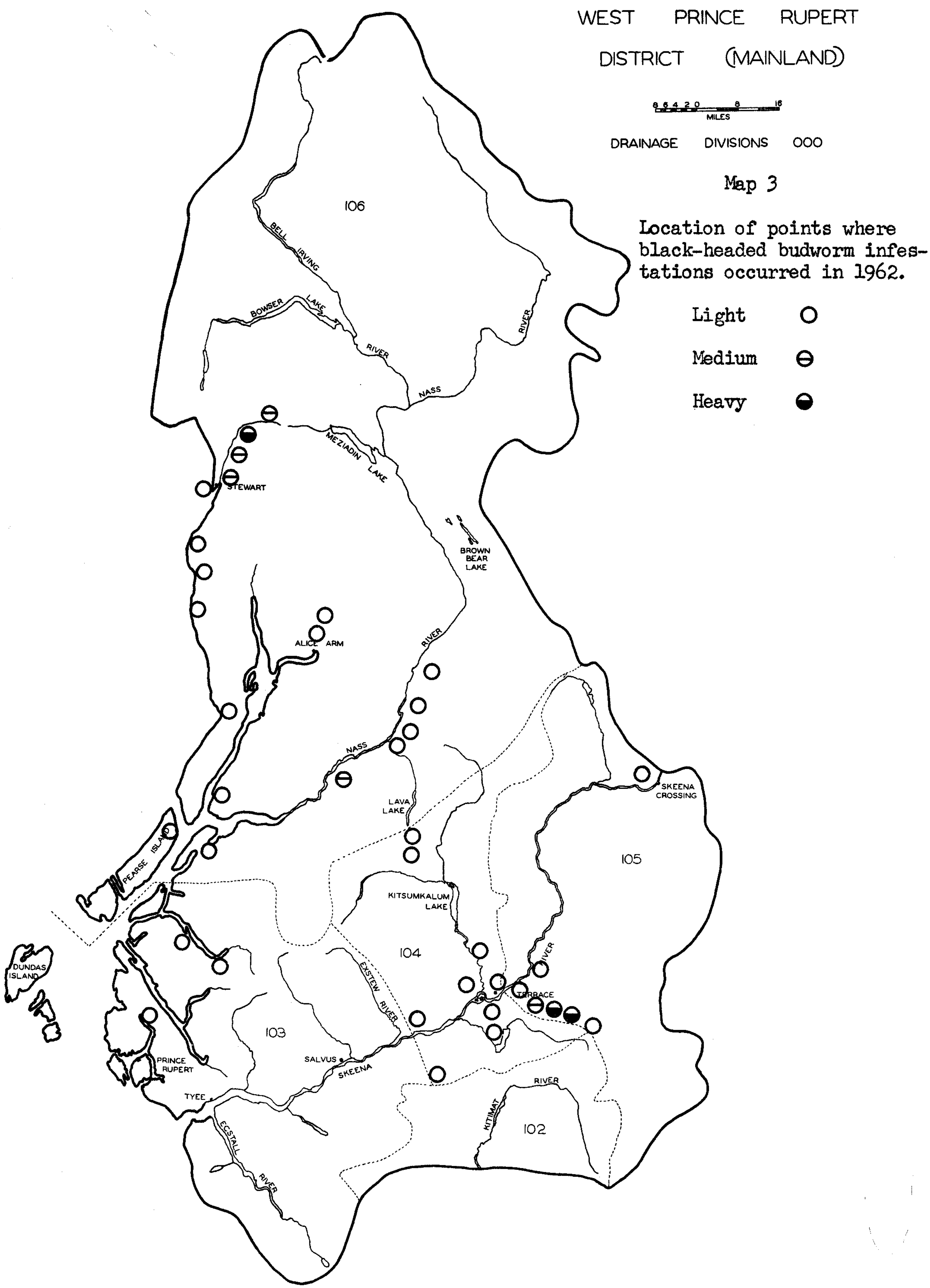


Map 2

Location of points where one or more collections were made and field records taken in 1962.

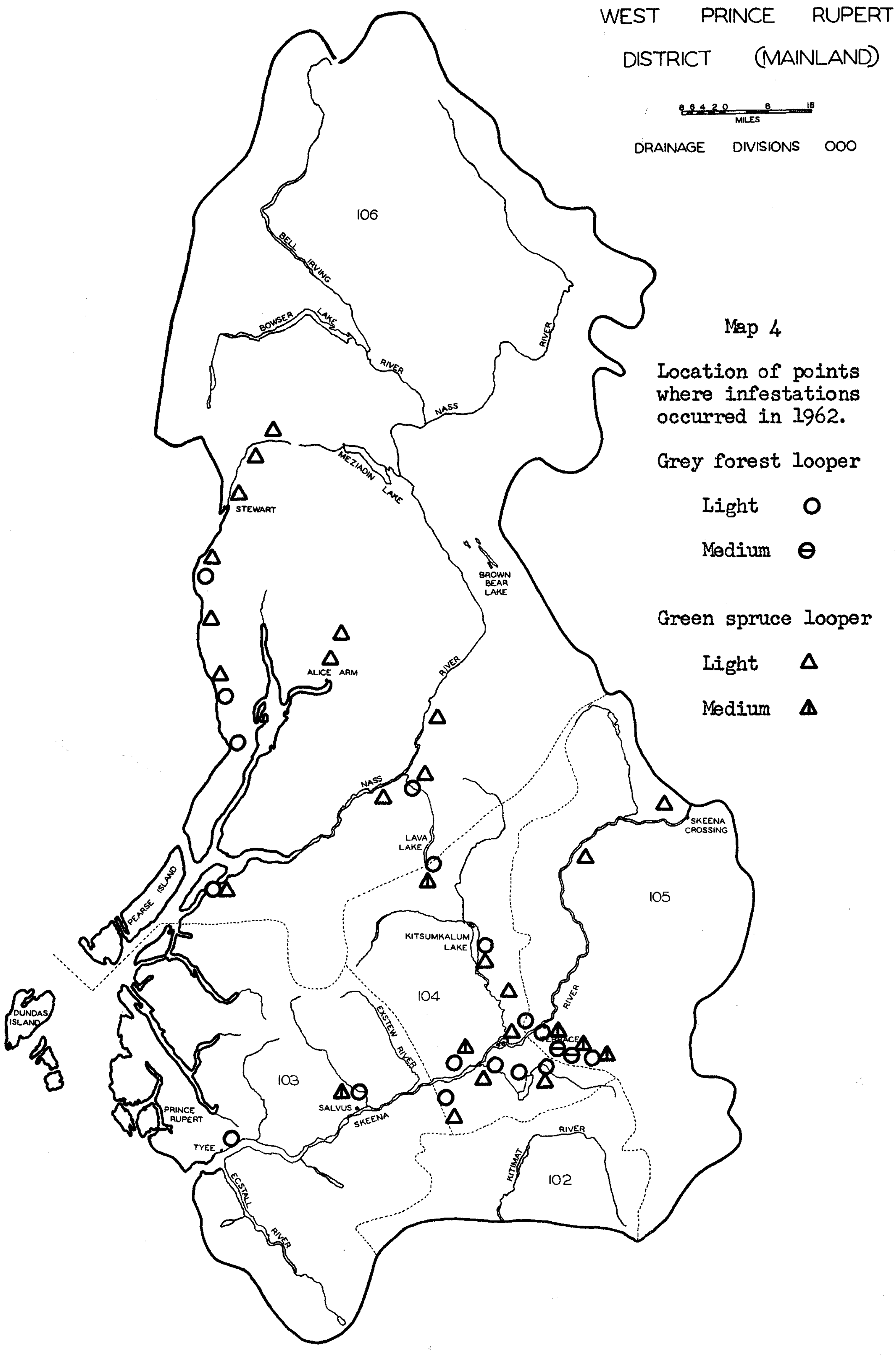
Forest insect ●

Forest disease ▲



Map 3

Location of points where black-headed budworm infestations occurred in 1962.



Map 4

Location of points where infestations occurred in 1962.

Grey forest looper

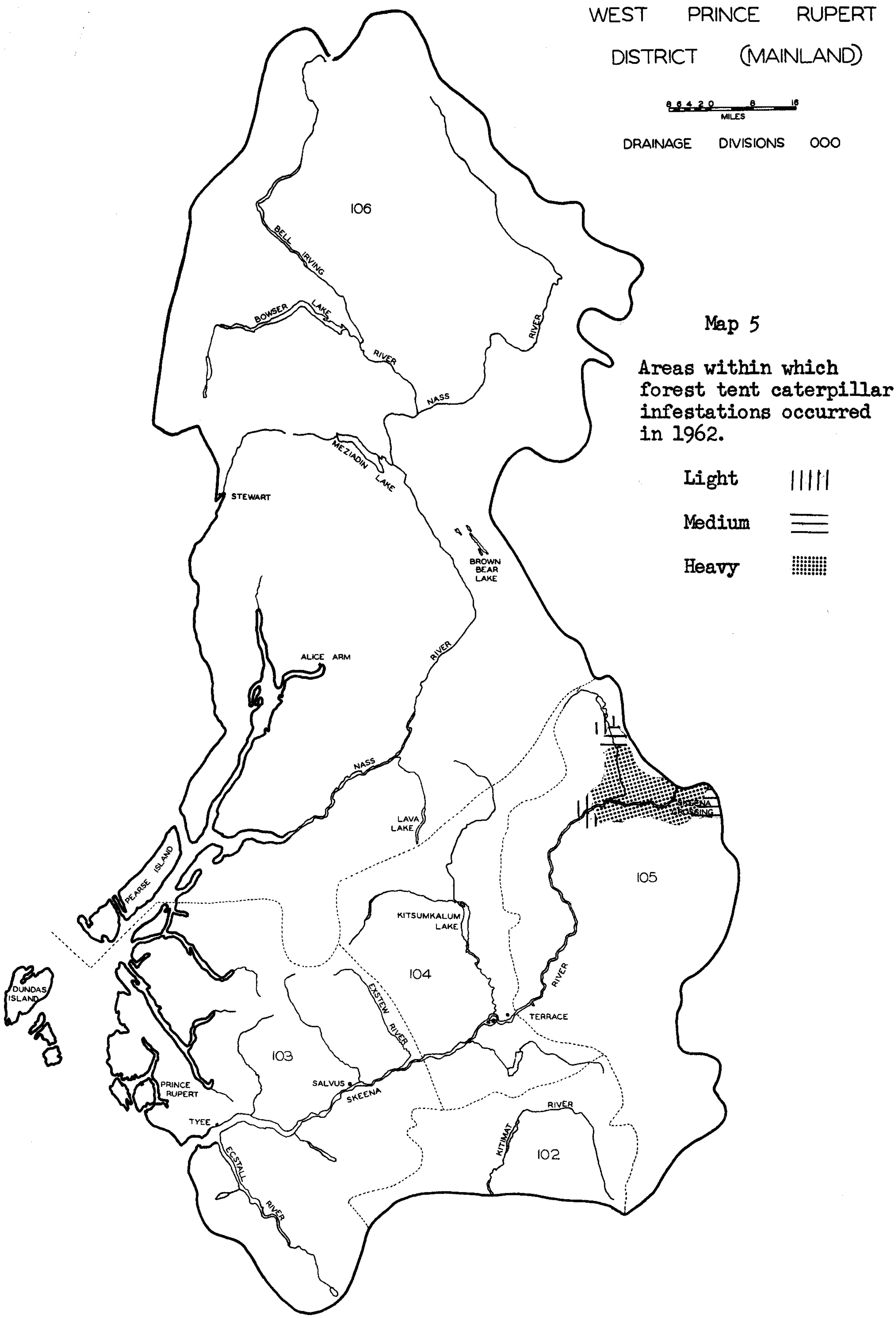
Light ○

Medium ⊖

Green spruce looper

Light △

Medium ◭



Map 5

Areas within which forest tent caterpillar infestations occurred in 1962.

Light |||||

Medium ═

Heavy ░

FOREST INSECT AND DISEASE SURVEY

EAST PRINCE RUPERT DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

EAST PRINCE RUPERT DISTRICT

1962

A. K. Jardine

INTRODUCTION

The 1962 field season in the East Prince Rupert District commenced on May 28 and ended on September 20. One week was spent in the West Prince Rupert District in September on a saddle-backed looper survey. A total of 317 forest insect and 78 forest disease collections was made. These are listed by hosts in Table 1. Location of points where collections were made and field records taken are shown in Map 1.

Table 1

Collections by Hosts

East Prince Rupert District - 1962.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	3		Alder, red	2	1
Fir, alpine	64	7	Aspen, trembling	14	25
Hemlock, western	8		Birch	2	
Pine, lodgepole	34	7	Dogwood, osier	1	2
Spruce, Sitka	9		Maple,	2	
Spruce, western			Poplar	1	3
white	133	8	Willow	1	11
Juniper, Rocky			Miscellaneous	24	12
Mountain		1	No host	19	
Total	251	23	Total	66	54
			GRAND TOTAL	317	77

STATUS OF INSECTS

Two-year-cycle Spruce Budworm, Choristoneura fumiferana (Clem.)

This was the second year of the two-year-cycle spruce budworm in the East Prince Rupert District. The population was so light over most of the infestation area that defoliation was difficult to see. Only areas with a distinctly reddish appearance due to heavy defoliation of current growth could be mapped from the air. The extent of defoliation in 1962, as mapped from the air (Map 2), decreased compared with 1960. No attempt was made to compare the area of infestation in 1960 and the area showing defoliation in 1962 because of the exceedingly light feeding this year. The largest portion of the spruce budworm infestation, which is in the West Prince George District, decreased in extent and intensity.

The trend of the two-year-cycle spruce budworm population was obtained by comparing the number of larvae in 1962 with the previous coinciding year of development, 1960. From 1960 to 1962 the average number of larvae per square foot of foliage in comparable samples for all hosts decreased from 19.8 to 3.1 (Table 2). The number of egg masses per square foot of foliage decreased from 2.1 in 1960 to 0.3 in 1962 (Table 3). The majority of the egg masses found during the 1962 fall survey were small, discolored, dried up, and with a generally unhealthy appearance. This was especially true of the Pinkut Lake area. A low population is anticipated in 1963, although defoliation may occur in some localized areas.

Although defoliation throughout much of the outbreak area has been severe, tree mortality has been remarkably light. Understory trees have suffered the most severely, and a high percentage have been killed in localities where defoliation has been heavy since 1954 and 1956. There has been a heavy loss of foliage, and top kill is common in the Nilkitkwa River, Suskwa trail, Cronin Mine road, and Chapman Lake areas. No intermediate or overstory trees have been killed as a direct result of spruce budworm attacks at any location. Trees in most areas have already shown signs of renewed vigor and tree recovery is expected to continue in 1963.

Summary

The sharp decline in both larval and egg counts indicates that the spruce budworm outbreak is declining. Parasitism or disease has not exerted sufficient control by themselves to account for the population decrease. One factor could be a general decline in the vigor of the insects, which has been demonstrated by the reduced number of eggs per mass. Light populations can be expected in 1963 at Pinkut and Taltapin lakes and in the Suskwa trail area.

Alaska Spruce Beetle, *Dendroctonus borealis* Hopk.

A brief review shows that considerable damage and tree mortality has been caused by the Alaska spruce beetle at several locations in the East Prince Rupert District over the past years. Attacks have been recorded since 1947, when control work was initiated by the Vernon laboratory on a small localized outbreak near Palling, Burns Lake Ranger District. Two years later in 1949 a similar outbreak occurred only a short distance from the first. Approximately 100 mature white spruce were affected on a 16-acre area. Successful salvage and control measures were undertaken in this outbreak area in the fall of the same year. Only very light single attacks were observed in the district until 1954, when approximately 5,000 cubic feet of timber were salvaged in a small infestation at Rose Lake. Unsalvaged snags had an estimated volume of 2,000 cubic feet.

Table 2

Average Number of Spruce Budworm Larvae per Square Foot of Foliage.

East Prince Rupert District.

Locality	Larvae per sq. ft. of foliage					
	1960			1962		
	Ba	Sw	Pl	Ba	Sw	Pl
1/4 mi. Nilkitkwa R. trail	8.5	6.3		1.3	2.1	0
Suskwa River trail	6.5	3.9		5.9	6.8	
Opp. McKendrick Island	11.1	-		8.8	2.5	
Cronin Mine Jct.	-	-		0	0	
N. end Chapman Lake	87.5	25.7		1.0	2.3	
Cronin Mine Road	34.6	35.0		2.4	1.7	
Smithers Ldg.	-	-		3.1	2.3	
Hatchery Arm	-	-		0.9	1.9	
Pinkut Lake	-	10.6		-	1.4	0.2
Taltapin Lake	7.7	-		1.3	1.5	0
Fulton Lake				0.8	0.9	
Topley Ldg Rd.				2.6	0.8	
Hagan Arm				1.5	1.5	0.8
Wright Bay					1.1	
Average	26.0	11.6		2.5	1.9	0.3
Average (comparable samples only)	26.0	16.1		3.5	2.9	-

Table 3

Average Number of Spruce Budworm Egg Masses per Square Foot of Foliage. East Prince Rupert District.

Location	Egg masses per sq. ft. of foliage 1960			1962		
	Ba	Sw	Pl	Ba	Sw	Pl
1/4 mi. Nilkitkwa River trail	1.0	0.8		0.2	0.0	
Suskwa River trail	1.6	1.5	2.8	0.4	0.5	0.4
Opp. McKendrick Island	2.8			0.0	0.0	
N. end of Chapman Lake	0.2	1.3		0.0	0.0	0.0
Cronin Mine Road	2.3	0.5		0.0	0.0	
Doris Lake	0.4	0.6		0.0	0.4	
Smithers Landing	0.7	0.7				
Fulton Lake		0.4				
Hatchery Arm	2.6	3.0		0.2	0.0	
Hagan Arm	0.7	8.9	2.2	0.2	0.3	
Pinkut Lake		0.9	5.3	2.0	2.7	0.4
Taltapin Lake	1.5	0.6	3.7	1.1	0.0	0.6
Cronin Mine Junction	0.4			0.0	0.0	
Wright Bay		0.1		0.0	0.0	
Average	1.3	1.6	3.5	0.3	0.3	0.3
All hosts		2.1			0.3	

During an aerial survey on July 23, 1962, approximately 200 red- and yellow-top trees were counted at the east end of Taltapin Lake. Ground checks indicated that this was a very low figure as many beetle-attacked trees had not changed colour. The outbreak was appraised on September 7.

The outbreak covered an area of approximately 220 acres of which 140 acres is classed as non-commercial although there are merchantable trees in the area. A 14 x 1 chain strip was run in the commercial timber, and all trees six inches d.b.h. and over were tallied by two inch diameter classes under four classifications; 1) grey - dead prior to 1961, 2) dead - trees attacked in 1961, had turned color, and were dropping their needles, 3) green attacked - trees attacked in 1962 but were still green, and 4) healthy - not attacked by beetles.

Of the 260 trees tallied 124 or 47.6 per cent were attacked in 1962, 30.4 per cent were attacked in 1961, and five per cent previous to 1961 (Table 4). Only 16.9 per cent of the trees were not attacked. All trees over 16 inches d.b.h. have been attacked, indicating a preference for the larger diameter trees.

Total volume of spruce on the 1.4 acre strip was calculated at 8,378 cubic feet or 5,984 cubic feet per acre. For the purpose of estimating total volume this figure was considered representative of the 80 acres of commercial timber. No measurements were made in the 140 acres of non-commercial timber. The tree diameters and the intensity of beetle attack were similar, the major difference was the shorter tree heights. For this reason an average volume of 3,000 cubic feet per acre was used in computing volumes.

The total volume was estimated at 898,700 cubic feet (Table 5). About 50 per cent of the volume losses resulted from beetle attacks in 1962, and over 86 per cent has been killed in the past two years.

A salvage operation is planned for the infestation area. It is hoped that as many of the beetle infested trees as possible will be removed. However, a large beetle population is expected in 1963, and many of the remaining healthy trees in the area will probably be attacked.

A small amount of white spruce was killed by these beetles in the vicinity of Owen Lake in 1962 in an open area subject to flooding. A total of 34 trees were examined, 10 had been attacked and killed. The flood condition could have weakened the trees. Although a few adult beetles were found hibernating in the base of a dead tree, the majority of the population had been pitched out. Mature spruce were also attacked in the Suskwa Trail area at the north end of Babine Lake, opposite McKendrick Island, opposite Old Fort village, opposite Bear Island, Wright Bay, Fort Babine, Smithers Landing road, Topley Landing, Shoulder Mountain lookout road, north end of Chapman Lake and at John Brown Creek near Moricetown. Trees in the Chapman Lake area have been severely weakened by continuous spruce budworm feeding.

Table 4

Condition of White Spruce Trees on 14 Chain Strip at

Taltapin Lake, September 7, 1962.

Diameter class (inches)	Old grey	Dead	Green attacked	Healthy	Total
6	2	4	7	6	19
8	1	6	16	14	37
10	3	10	15	7	35
12	4	5	24	6	39
14	1	8	13	7	29
16	-	14	22	4	40
18	2	12	6	0	20
20	-	11	9	0	20
22	-	8	9	0	17
24	-	1	2	0	3
28	-	0	1	0	1
Total	13	79	124	44	260

Table 5

Approximate Volume of Timber (cu. ft.) in Infestation at

Taltapin Lake.

Area	Old grey	Dead	Green attacked	Healthy	Total
80 acres	14,400	196,300	239,400	28,700	478,700
140 acres	12,600	172,200	210,000	25,200	420,000
220 acres	27,000	368,500	449,400	53,900	898,700

There is no doubt that the spruce beetle population is increasing in the East Prince Rupert District. Trees were attacked in 12 localities in 1962, compared with one know locality in 1961.

A Scolytid in Lodgepole Pine Terminals, <u>Pityophthorus</u> <u>confertus</u> Sw.

The first occurrence of this insect in the coastal area of the province was recorded in 1962 in an area of lodgepole pine regeneration 1.2 miles north of Kispiox near Hazelton. Damage was quite similar to the lodgepole pine weevil <u>Pissodes</u> <u>terminalis</u> Hopk. and was always found in association with the weevil. On each tree infested the terminal and a few side laterals were killed. It has not been established if the <u>Pityophthorus</u> is a primary or secondary insect.

Forest Tent Caterpillar, <u>Malacosoma</u> <u>disstria</u> Hbn.

The widespread forest tent caterpillar infestation in the East Prince Rupert District continued in 1962 with equal intensity. The outbreak was mapped from the air in July. Heavy defoliation of aspen, the primary host, was observed to the western boundary of the district, approximately 20 miles north of Hazelton in the Kispiox and Skeena River valleys, medium to heavy feeding in the Bulkley Canyon area, with heavy feeding east along the Suskwa River Valley and Harold Price Creek. Heavy defoliation occurred again throughout the Bulkley River Valley from Beaumont to Round Lake south of Telkwa, (Map 3).

A considerable amount of feeding was observed on white spruce at several locations where spruce trees were growing in predominantly aspen stands. Many young spruce in the Kispiox Valley, Hazelton, Moricetown, Smithers and along the Telkwa high road, lost from 30 to 90 per cent of their current year's growth. A few young spruce in the latter area had the top three to four feet completely defoliated.

Study areas established to follow the trend of this insect were sampled again in 1962 using the sequential method (Table 6). The results indicate that light to heavy defoliation is expected in 1963 unless natural control factors exert heavy pressure on the population.

There is considerable parasitism associated with the outbreak, and virus disease is also present in the population.

Mountain Pine Beetle, <u>Dendroctonus</u> <u>monticolae</u> Hopk.

Mountain pine beetles have been responsible for heavy losses of lodgepole pine in the East Prince Rupert District over the past years. The greatest loss has been in the Babine Lake area adjacent to the Prince George District. Aerial surveys over the district since 1958 have revealed a steady decline in the number of red tops, with tree mortality dropping to relatively low levels in 1960. During the spruce budworm aerial survey in July 1962, 5,065 red trees were counted,

Table 6

Numbers of Forest Tent Caterpillar Egg Masses at Five Sample Points of the Infestation. September 1962.

Location	No. of trees sampled	Total no. of egg masses	Predicted defoliation
Kispiox Valley	11	13	light
New Hazelton	10	21	light
Moricetown	2	18	heavy
Smithers	3	50	heavy
Telkwa	1	30	heavy

comprising a volume of 151,950 cubic feet. The majority of the red tops occurred in the Babine Lake area. Heaviest mortality was observed in the general vicinity of Hagan Arm (Map 4). This area has been subject to heavy beetle attacks for a number of years. Mortality is expected to continue in 1963.

A Geometrid on Birch, Rheumaptera hastata (Linn.)

On June 26 a heavy moth flight of this leaf rolling geometrid was observed in a 40 mile area of the Kisgegas road north of Hazelton. On August 18 birch trees on both banks of the Skeena River were heavily skeletonized and stands in large areas were completely defoliated. Although the preferred host was birch, some larvae were found feeding on willow. No disease or parasitism was found associated with the outbreak and heavy feeding will probably occur in this general area again in 1963. Adults of this geometrid were observed in many other localities of the district in 1962, but there was no apparent defoliation.

The Lodgepole Pine Weevil, Pissodes terminalis Hopk.

The lodgepole pine weevil, Pissodes terminalis Hopk., previously identified as Pissodes radiatae Hopk., was common in many stands of lodgepole pine throughout the East Prince Rupert District again in 1962 but the number of trees infested decreased compared with 1961. Heaviest attacks were found in the Nadina River area and in stands between Francois and Ootsa Lake. No new attacks were found in the plot established outside Telkwa in 1961 to follow the trend of this insect. Parasite cocoons were common in most leaders examined, but sampling was not intensive enough to determine if parasitism was responsible for the decrease in population.

Swallow Tail Butterfly, _Papilio rutulus_ Luc.

There was an exceptionally large population of this butterfly throughout most of the district in 1962. Heavy flights were observed in June, July, and August, in the Bulkley River Valley, from Burns Lake south to Francois Lake, along the north shore of Francois Lake and in many areas around Babine Lake. The larvae of this insect normally feed on willow, alder, aspen and other deciduous growth. An examination of stands later in the season revealed no signs of feeding or larvae.

Aphids on Trembling Aspen, Species Unknown.

An unknown species of a small green aphid on aspen was prevalent in the East Prince Rupert District his year throughout the range of the host. Damage was apparent in the form of curled leaves which became very sticky and discolored. A high percentage of trees in affected stands dropped their leaves prematurely. Chokecherry trees over a considerable area near Old Fort at the north end of Babine Lake were attacked by a similar green aphid.

Engelman Spruce Weevil, _Pissodes engelmanni_ Hopk.

Terminal damage by the engelmann spruce weevil was observed in the district again this year. Light attacks were found on young white spruce in areas of regeneration at Telkwa, Houston, and 4.4 miles north of Kispiox near Hazelton.

Grey Forest Looper, _Caripeta divisata_ Wlk.

The grey forest looper population increased slightly in 1962 compared with 1961. A total of 21 larvae was collected this season in three samples, two on western hemlock and one on spruce, compared to seven larvae in four samples in 1961.

Spruce Sawflies, _Pikonema_ sp.

Small numbers of spruce sawflies were again found throughout the district in 1962. Eighteen collections containing _P. dimmockii_ (Cress.) averaged 2.7 larvae each and 12 collections containing _P. alaskensis_ (Roh.) averaged 1.7 larvae. The principal host was white spruce.

Cedar Bark Beetle, _Phloeosinus punctatus_ Lec.

A single attack by this bark beetle was found at mile 15 on the Kisgegas road near Hazelton and one specimen was collected in a beating sample from cedar in the Kispiox Valley.

Black-headed Budworm, Acleris variana (Fern.)

The population of the black-headed budworm increased slightly over 1961 but distribution remained approximately the same. In 1962, 63 larvae were found in 10 collections, compared to 54 larvae in 11 collections in 1961. The largest number of 29 larvae was collected on alpine fir in the McBride Lake area, compared to 28 larvae from the same locality in 1961.

Green-striped Forest Looper, Melanolophia imitata Wlk.

No larvae of this geometrid were found in the East Prince Rupert District in 1962, compared to 19 larvae found in 1961.

Green Velvet Looper, Epirrita autumnata Harr.

Twenty collections made in 1962 at widely separated locations in the district contained an average of 5.4 larvae each. Although this insect was found in a smaller number of collections in 1962, the average number of larvae per collection was slightly higher than in 1961. The largest collection, 30 larvae, was made at McBride Lake on alpine fir. Other hosts were white spruce, western hemlock and lodgepole pine.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Attacks by the aspen leaf miner continued in 1962 with approximately the same extent and intensity as in 1961.

Spruce Tip Moth, Zeiraphera sp.

Terminal attacks to young white spruce have been recorded for the first time in the East Prince Rupert District. One larva was found in a damaged terminal on the Nilkitkwa River Trail at the north end of Babine Lake. Lateral attacks were recorded on young spruce on the Kisgegas road near Hazelton and single larvae appeared in beating samples at Nadina Lake, Nadina River, Sediesh Creek, and Intata Reach, Ootsa Lake.

An Aspen Leaf Roller, Unidentified

An infestation of a leaf rolling tortricid occurred throughout the forest tent caterpillar infestation this year. The larvae feed in the curled up leaves.

OTHER NOTEWORTHY INSECTS

East Prince Rupert, 1962

Insect	Host	No. of collections	No. of larvae	Remarks
Adelges cooleyi Gill.	Sw	3		Common on white spruce throughout the eastern part of the district.
Enypia venata Grt.	Ba, Sw	4	4	Compared to 22 larvae in 8 collections in 1961.
Griselda radicana Wlshm.	Sw	4	13	Found in small numbers associated with Zeiraphera sp.
Neodiprion sp.	Sw, Pl, Ba	8	15	Continued at low population level.
Semiothisa sp.	H, Ba, Sw, C	9	20	Continued low populations.
Ips. sp.	Pl, Sw	-	-	Found attacking weakened and damaged trees at Taltapin Lake, Ootsa Lake, Babine Lake, and along Smithers Landing road.
Pseudohylesinus sp.	Pl, Sw	-	-	Associated with Ips sp.

STATUS OF FOREST DISEASES

Important Diseases

Rusts

Melampsora rust of aspen.

Special surveys were carried out again in 1962 in connection with the discovery of a Melampsora rust killing young yellow pine seedlings at Telkwa (see foreword). Aspen leaves bearing the telial stage of Melampsora albertensis Arth. were collected in June near Endako and on the Nilkitwa River trail at the north end of Babine Lake for use in inoculation studies. In order to obtain the distribution of this rust in the district, samples of the uridinial stage were collected at the following locations: Telkwa High road, Smithers, Moricetown, and near Houston. Infections were heaviest in the Smithers - Telkwa areas. No infections of the aecial stage of this rust were found on pines or Douglas-fir in any natural stands in the district this year.

A Rust Complex on Lodgepole Pine

Heavy infections of Peridermium stalactiforme Arth. and Kern, were recorded in a small area of lodgepole pine regeneration near Burns Lake. Equally heavy infections were also recorded in similar sized stands of pine near Telkwa and along the Nadina River south of Houston. Heavy infections of Coleosporium asterum (Diet.) Syd. were also found on pine needles of the trees attacked by P. stalactiforme in the Burns Lake area and similar infections were found on young pine in the Whitesail Lake area. The alternate host for Coleosporium, showy aster, was heavily infected in each area. This disease was most prevalent on the very small trees and seedlings and the resultant defoliation gave them a sparse appearance. In the infected areas near Telkwa and the Nadina River, the rusts Cronartium comandrae Peck. and P. stalactiforme were found together. Each of the rusts mentioned here are capable of causing severe damage to lodgepole pine. The rusts mentioned in this section are being studied.

Spruce Cone Rust.

Attacks by Chrysomyxa pirolata Wint. were common on white spruce cones at various localities throughout the district in 1962. Tree tops had a distinct yellowish appearance. This was especially noticeable in the Nilkitkwa trail area at the north end of Babine Lake.

Spruce Needle Rust

Light infections of Chrysomyxa weirii Jacks. were found at several locations in the district with no serious damage being caused.

Needle Rust on Alpine Fir.

Heavy infections of Peridermium holwayi Syd. were noticed on young alpine fir in the Nilkitkwa trail area. Many trees examined had up to 100 per cent of their one-year old needles infected. Light infections of this disease were noticed at various other locations in the district.

Cytospora Cankers

Light to heavy infections of various hosts by Cytospora sp. were common throughout the East Prince Rupert District in 1962. The fungus occurred either in its imperfect Cytospora state or its perfect Valsa state. The tree species affected were, trembling aspen, black cottonwood, red osier dogwood, willow and mountain ash. All infections occurred on open growing trees. Valsa sp. on trembling aspen and red osier dogwood constituted new host records. Heavy infections of Cytospora were found associated with a considerable amount of aspen mortality on the Topley Landing road. It is generally considered that predisposition is necessary for infections by this fungus, such as unfavorable climatic conditions or site factors.

Ink Spot of Aspen.

A species of Sclerotium was responsible for heavy defoliation of localized areas of aspen in numerous localities in the district in 1962. Several years earlier this disease caused almost total defoliation of aspen in the Smithers area. Since then, however, only one localized attack was found near Euchu Lake in 1960 which almost completely disappeared by 1961. By 1962 the disease became epidemic again and light to heavy infections were observed throughout the host's range in the district. Heaviest infections were observed at the following locations: Telkwa High road, Topley, Priestly Stn. road, Hicks Hill Lookout road and at Wistaria near Ootsa Lake. Further attempts will be made in 1963 to obtain the perfect state of this disease.

OTHER NOTEWORTHY DISEASES

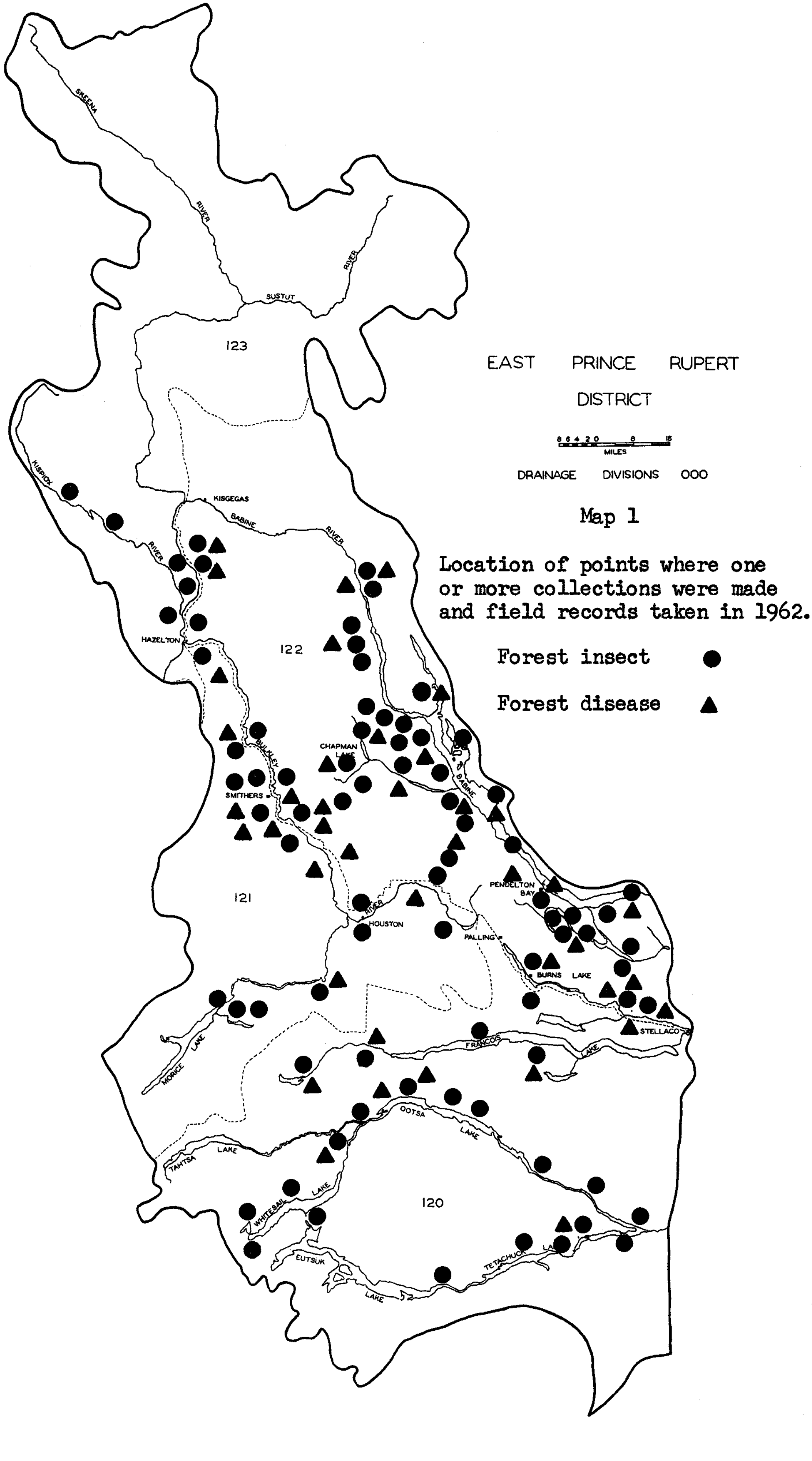
Host	Organism	Locality	Remarks
Alder, red	Didymosphaeria oregonensis Goodd.	Suskwa River trail	Stem and branch canker. Light infections in this area.
Fir, alpine	Dasyscyphus sp.	Nilkitkwa River trail	Canker causing red flagging. Light infections.
Juniper, common	Gymnosporangium nidus - avis Thaxt.	Babine Lake	Rust swelling. Single infection.
Pine, lodgepole	Arceuthobium americanum Nutt. ex Engelm.	Ootsa Lake	Dwarf mistletoe. Heavy infections.
Raspberry, western red	Phragmidium rubi-idaei (DC.) Karst.	Opp. McKendrick Island	Alternate host for rust on white spruce. Heavy infections.
Rose, common wild	Phragmidium fusiforme Schroet.	Wright Bay	Rust common in this area, causing heavy defoliation.
Tea, labrador	Chrysomyxa ledi var. groenlandici Savile	Endako	Alternate host for spruce needle rust. Heavy infections in this area.

OTHER NOTEWORTHY DISEASES - continued

Host	Organism	Locality	Remarks
Saskatoon	*Gymnosporangium clavarii forme* (Pers.) DC.	Ootsa Lake	Alternate host for rust on juniper. Heavy infections in this area.
Saskatoon	*Gymnosporangium* ? *nidus-avis* Thaxt.	opp. McKendrick Island	Light infections common in this area.
Willow sp.	*Gloeosporium* sp.	Mercury logging Babine Lake	Cankerous dieback, common. New host record.
Willow sp.	*Septomyxa salicis* Grove	Wright Bay Babine Lake	Cankerous dieback, common throughout area. New host record for DAVFP.
Willow sp.	*Melampsora epitea* Thüm.	Nilkitkwa River trail	Rust, light infections, common in district.
Willow, sp.	*Cytospora* sp.	Southbank	Single infection, cankerous dieback on stem.

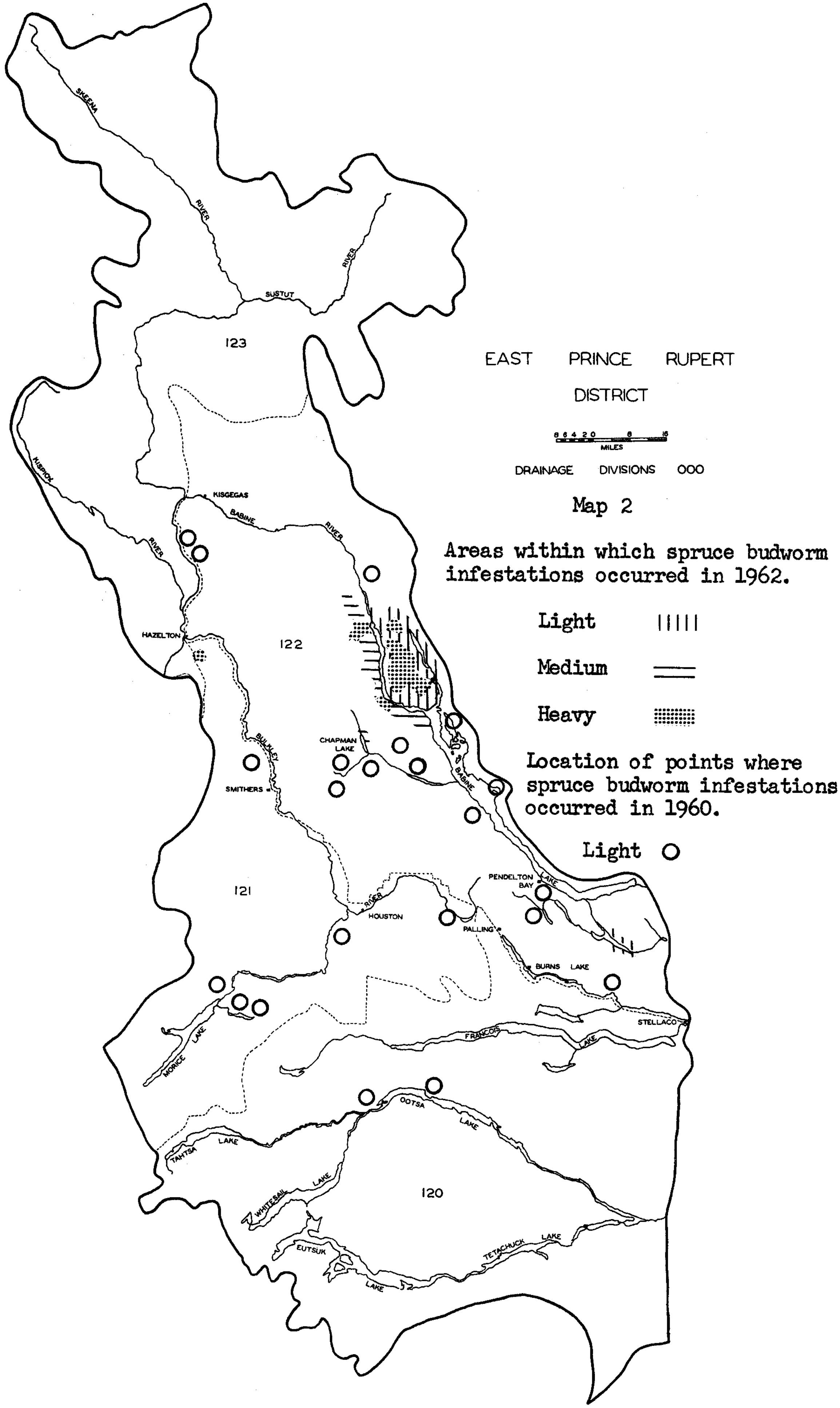
Previous Collections with Recent Identification

Host	Organism	Locality	Remarks
	1961		
Cedar, red	*Polyporus cuneatus* (Murr.) Zeller	Skeena River Hazelton	Conks on old logs.
Fir, alpine	*Sydowia polyspora* (Bret. v Tav.) Müller	Hunter Basin Telkwa	Type of stem dieback single infection.
Poplar, silver	*Marssonia brunnea* (Ellis & Everh.) Sacc.	Smithers	Causing premature leaf drop. New host record.
	1960		
Spruce, black	*Chrysomyxa arctostaphyli* Diet.	Burns Lake	Rust, causing witches brooms, common in area.
	1961		
Spruce, white	*Phragmotrichum chailletii* Kunze	Seaton	White spruce cones attacked by this disease. New record.



Map 1

Location of points where one or more collections were made and field records taken in 1962.



Map 2

Areas within which spruce budworm infestations occurred in 1962.

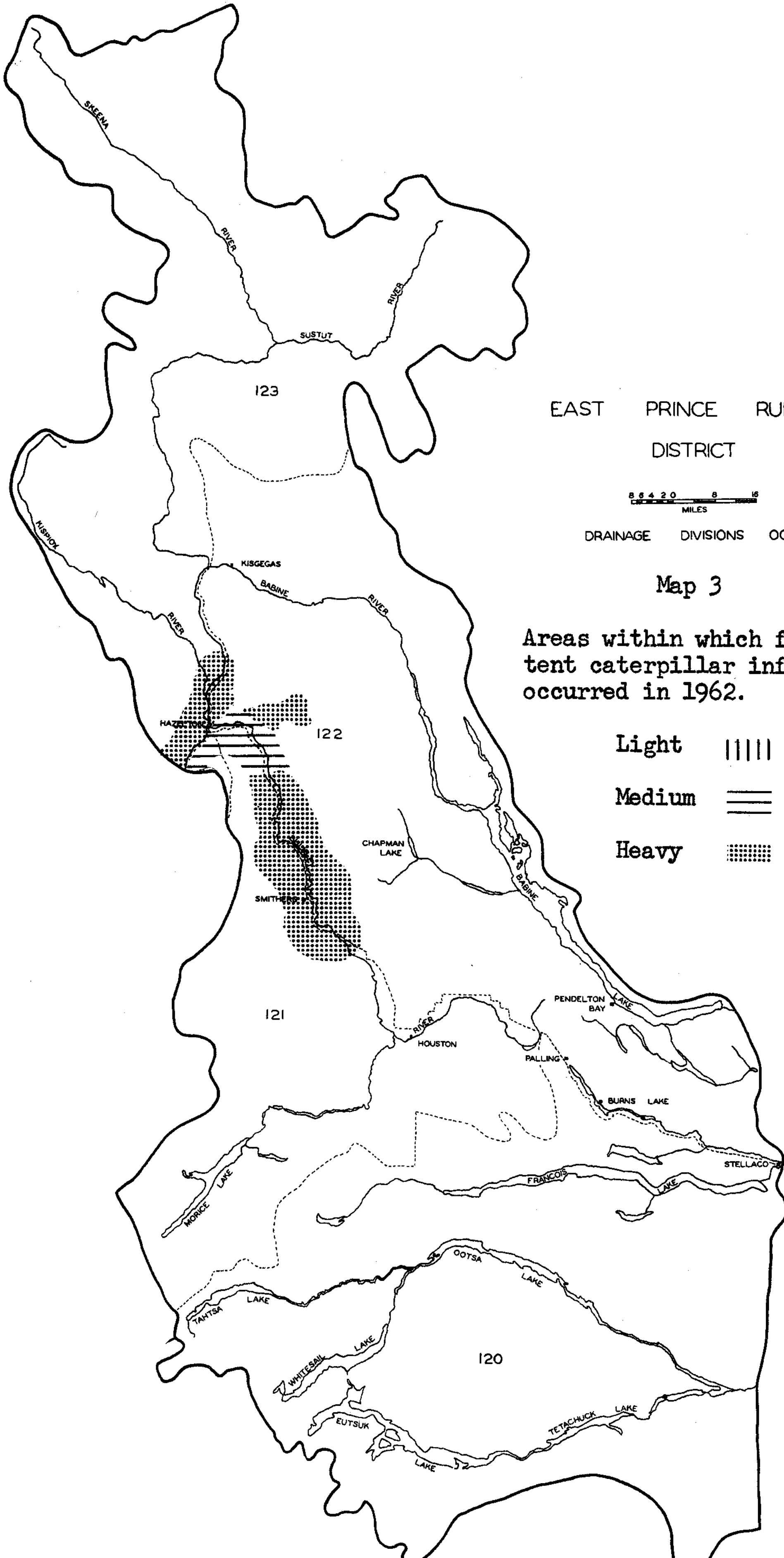
Light

Medium

Heavy

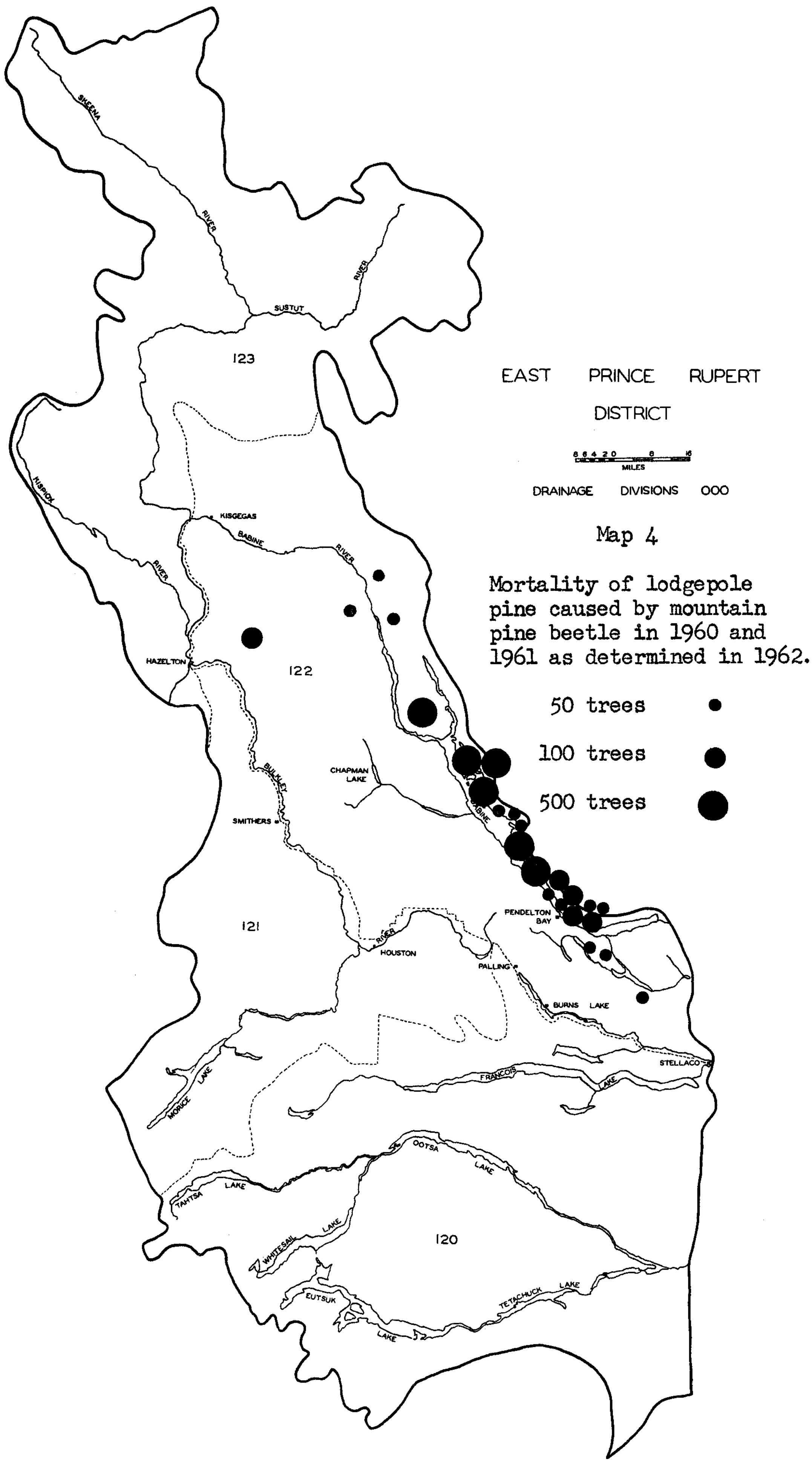
Location of points where spruce budworm infestations occurred in 1960.

Light



Map 3

Areas within which forest tent caterpillar infestations occurred in 1962.



Map 4

Mortality of lodgepole pine caused by mountain pine beetle in 1960 and 1961 as determined in 1962.

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

KAMLOOPS FOREST DISTRICT

FOREST INSECT AND DISEASE SURVEY

KAMLOOPS FOREST DISTRICT

1962

J. Grant

There was one change in Kamloops Forest District personnel in 1962: R. J. Andrews replaced C.B. Cottrell in Central Kamloops. T. A. D. Woods conducted the survey in West Kamloops and J. Grant in East Kamloops.

Bark beetles were again the most destructive group of forest insects in the District. Douglas-fir beetle damage was most extensive in the Cariboo and Chilcotin areas, but some serious losses occurred at several localities elsewhere. Mountain pine beetle populations apparently increased in 1961 and as a result, red-topped pines were more numerous in 1962 than for several years. Losses were heaviest in lodgepole and western white pine stands, with few ponderosa pine stands being seriously affected.

Infestations of the Douglas-fir tussock moth were confined to the North Okanagan and lower Similkameen valleys, and defoliation was not much more extensive than in 1961. Larval populations in most localities were greatly reduced by a virus disease but it is expected that some of the infestations will continue in 1963.

An unprecedented outbreak of the jack-pine needle miner resulted in conspicuous discoloration of lodgepole pine stands in the Falkland, Barriere, and North Okanagan districts. Autumn sampling in three widespread localities revealed that the infestations had collapsed.

An infestation of white pine butterfly, the first in the history of the Forest Insect Survey in Interior British Columbia, caused light to moderate defoliation of a 450-acre ponderosa pine stand near Okanagan Landing. A high overwintering egg population indicated that defoliation will be heavier in 1963.

Needle cast infections of conifers were not greatly changed from their 1961 levels, except for larch needle cast which increased in severity in the Shuswap River drainage. A foliage disease caused conspicuous discoloration of aspen stands in the Cariboo.

FOREST INSECT AND DISEASE SURVEY

EAST KAMLOOPS DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

EAST KAMLOOPS DISTRICT

1962

J. Grant

INTRODUCTION

Field work began in the East Kamloops District on April 11 and ended on November 8. Temperatures for most of the field season averaged below normal except for the autumn months, when warm weather prevailed. A total of 322 forest insect collections and 52 forest disease collections were taken by Department of Forestry personnel and cooperators. These are listed by host in Table 1, and Map 1 shows localities where collections and field records were taken.

Table 1

Collections by Hosts

East Kamloops District, 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	4	-	Alder, mountain	1	-
Cedar, yellow	-	1	Alder, Sitka	7	1
Douglas-fir	86	4	Aspen, trembling	15	24
Fir, alpine	27	2	Birch, water	1	-
Fir, amabilis	3	-	Birch, western white	8	-
Fir, grand	3	-	Cherry, bitter	1	-
Hemlock, mountain	1	-	Cherry, choke	5	-
Hemlock, western	13	-	Cottonwood, black	4	1
Juniper, Rocky Mountain	4	-	Maple, Douglas	5	-
Larch, western	8	1	Saskatoon	2	-
Pine, lodgepole	16	3	Willow spp.	7	2
Pine, ponderosa	29	8	Miscellaneous	33	2
Pine, western white	12	1	Total	89	30
Pine, whitebark	2	-			
Spruce, Colorado blue	1	-			
Spruce, Engelmann	23	2			
Yew, western	1	-			
Total	233	22	Grand total	322	52

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Very few Douglas-fir trees attacked in 1962 began to change colour before late autumn, probably because of a late spring and the prevalence of cooler than normal weather through most of the summer. Consequently it was difficult to determine the severity of the current year's attack. Generally unfavourable weather during the spring flight period probably resulted in fewer successful attacks than in 1961.

Surveys of red-foliaged trees for the damage appraisal continued in 1962. Table 2 shows the number and location of Douglas-fir believed to have been killed by bark beetles in the period 1959-1961.

Table 2

Douglas-fir Trees Killed by the Douglas-fir Beetle in the Period 1959-1961, as Determined in 1962, East Kamloops District

Locality	No. of trees	Volume (cu. ft.)
Monte Creek - Upper Salmon River	2,200	154,000
Chase-Monte Creek	20	1,400
Falkland-Westwold	1,200	78,000
Falkland-Chase	400	26,400
Pinaus Lake	110	7,100
Shuswap Lake-Adams Lake	80	4,800
Enderby-Mabel Lake	100	7,000
Lumby-Cherryville	400	26,400
Winfield-Mission Creek	200	12,000
West Side Okanagan Lake	150	9,000
Princeton-Brookmere-Aspen Grove	700	56,000
Copper Mountain-Manning Park	60	3,600
Total	5,620	385,700

Volumes were derived from measurement of infested trees in as many localities as was feasible. The increase in damage since the 1961 appraisal is a reflection of the generally favourable conditions for beetle attack which prevailed in the 1961 season.

A large scale trap tree program was initiated by Pondosa Pine Lumber Co. on Tree Farm License 16, in an attempt to localize bark beetle damage. A total of 486 trap trees which were to be removed from the woods or sprayed were felled in late April and early May. On June 26 trap trees at seven stations were examined to determine their success in attracting beetle attack. Entrance holes were counted on two square-foot samples of bark on the lower, mid and upper boles of two trees per locality. The program was considered successful, as an average of 5.3 entrance holes per square foot was recorded. Very few standing trees close to the trap logs had been infested.

A second trap tree project was undertaken on a timber sale near Aspen Grove, where 62 trees were felled during the last week of April. On July 20, 17 trees that had been felled in April and 13 trees pushed over during road-building the previous October were examined, in the same manner as those on Pondosa Pine Tree Farm Licence 16, to determine the "catch" of beetles. The trap trees averaged 3.9 attacks per square foot, and the trees that had been bulldozed the previous autumn, 2.3.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Damage in lodgepole and white pine stands has increased in the last two years and a few small infestations have occurred in ponderosa pine. Table 3 shows the approximate number of trees and volume killed in 1960 and 1961, as determined by ground and aerial surveys in 1962.

Table 3

Number of Trees and Volume Killed by Mountain Pine Beetle in East Kamloops District, 1960 and 1961

Locality	Pine species	No. of trees killed	Volume (cu. ft.)
Hayes Creek	ponderosa	150	16,500
Hayes Creek	lodgepole	80	2,400
Princeton-Aspen Grove	ponderosa	120	13,200
Tulameen-Brookmere	lodgepole	60	1,800
Lambly Creek	lodgepole	1,000	3,500
Heckman Creek	lodgepole	200	7,000
Sugar Lake-Upper Shuswap	western white	810	32,400
Mabel Lake-Wap R.	western white	600	36,000
Shuswap Lake-Adams Lake	western white	1,260	75,600
Sicamous-Three Valley	western white	100	6,000
Manning Park	western white	1,350	54,000
Total		5,730	279,900

The increase in the number of infested white pine was most marked in Manning Park and the Shuswap Lake and upper Shuswap River drainages. The infestation near Lambly Creek was noteworthy for the rapidity of its increase in the last two years.

A group of 52 infested white pine near Sugar Lake was felled and sprayed by the British Columbia Forest Service in early July, 1962, to prevent spread of the infestation. Spray consisting of one part of an emulsion of 3.75 lbs. ethylene dibromide, three per cent Triton X151 and one gallon of diesel oil per four parts of water was applied with adjustable nozzles supplied from back-tanks. Twenty-nine trees ranging from 10 to 16 inches d.b.h. were treated on July 7, and 23 trees on July 10. Weather during and after the spraying was favourable, with daily maxima of about 75° F.

The first examination to determine the effectiveness of the application was made on July 13, when four trees sprayed on July 7 were checked. On July 16 five more trees were examined, three of them being in the group sprayed on July 10. A one square foot section of bark was removed from the stump of each tree, and six from the lower, mid and upper part of the bole near the limit of infestation. One sample at each point was taken from the upper side of the log and one from the lower, giving a total of seven samples per tree. All larvae, pupae and adults of the mountain pine beetle were tallied and recorded as living or dead.

A total of 2,033 Dendroctonus was examined; 51.6 per cent were adults, 29.3 per cent pupae and 19.1 per cent larvae. Mortality of all stages averaged only 48.5 per cent, indicating that the operation had not given satisfactory control. Table 4 shows the number of Dendroctonus and percentage mortality in samples from the different locations on the nine trees sampled, and Table 5 shows mortality by stages and sample locations.

Table 4

Mortality of Mountain Pine Beetle in Bark Samples from Nine White Pines Sprayed with Ethylene Dibromide, Sugar Lake, 1962

Location of samples	No. of Dendroctonus (all stages)	Percentage mortality
Stump	300	35.3
Butt	965	47.7
Mid bole	559	52.1
Upper bole	259	59.5
Total	2,083	48.5

Mortality was highest in the immature stages on the upper side of the logs, but even in these categories, satisfactory control was not achieved. (Table 5).

Table 5

Mortality of Mountain Pine Beetle by Stage and Sample Location, in Samples from Nine White Pine Sprayed with Ethylene Dibromide, Sugar Lake, 1962

	Stump		Upper side		Lower side		Total	
	No. in all samples	Per cent mort.	No. in all samples	Per cent mort.	No. in all samples	Per cent mort.	No. in all samples	Per cent mort.
Larvae	71	40.8	166	88.0	162	51	399	64.6
Pupae	91	37.5	305	84.0	208	37.5	610	60.3
Adults	132	33.0	390	60.0	552	20.0	1074	35.8
Total	299	35.5	861	73.9	922	29.2	2083	48.5

The difference between spray effectiveness on upper and lower surfaces indicates that the application may have been inadequate on the lower sides of the logs, but the reason for the mortality in stumps, which apparently received a heavy dosage, is unknown.

An experimental trap tree program in advance of logging was undertaken by the British Columbia Forest Service about mid-July, in a lodgepole pine infestation in Heckman Creek Valley. About 100 trap trees were felled adjacent to two groups of infested trees. An evaluation of the trap trees' effectiveness in attracting mountain pine beetles was made on September 26 and October 2, when 32 trees were examined. The sampling method consisted of removing a square foot of bark on each side of the bole, near the butt, at mid-bole and at about eight inches diameter in the upper crown. Trap trees ranged from 12 to 20 inches d.b.h. and were from 62 to 90 years old. The sampling showed that although most of the trap trees had been infested, the population density was lower than is usually found in standing infested trees. The average intensity of attack in the 32 trees examined was 2.7 entrance holes per square foot. The highest number of attacks occurred on the butt sections in moderate shade; an average of 4.8 per square foot was recorded. One reason for the light attack could be that some of the trap trees probably were felled after the beetle flight was underway.

Western Pine Beetle, Dendroctonus brevicomis (Lec.)

Western pine beetles, in some cases associated with mountain pine beetles, killed scattered groups of mature ponderosa pines at several localities in the Princeton and Aspen Grove areas. An increase in the number of beetle-killed trees occurred on Timber Sale X77352 near Hayes Creek, in 1961; about half of the 70 red-tops examined on May 10, 1962, had been killed the previous year. Very few fresh red-tops were observed on the slopes along the Shuswap River north of Cherryville.

Engelmann Spruce Beetle, <u>Dendroctonus engelmanni</u> Hopk.

The localized infestation at Lightning Lake, Manning Park, persisted in 1962. An overmature stand in Castle Creek Valley, Manning Park, was considerably reduced by Engelmann spruce beetles but the current population is low.

Douglas-fir Tussock Moth, <u>Orgyia pseudotsugata</u> (McD.)

Although some of the 1961 infestations increased in extent and a few new ones developed in 1962, the outbreaks in the Okanagan and Similkameen valleys did not appear likely to assume the proportions attained by some previous epidemics. As in 1961, there was no evidence of a population increase in the Shuswap Lake-South Thompson areas.

A virus disease was present in most infestations and some populations were practically wiped out. Weather during the greater part of the larval period was quite cool and wet, in contrast to unusually warm weather which prevailed in 1961.

The northern infestation on Indian Reserve Number 1 near the head of Okanagan Lake increased to about 100 acres but most of the larvae died before causing serious defoliation. Spread of the infestation was generally northeastward from the area defoliated in 1961, and was attributed to dispersal of early instar larvae on air currents; egg sampling in the area of spread had shown a low population to be present. The infestation near the southern boundary of the Indian Reserve also collapsed when the larvae were quite small, although visible defoliation occurred over a larger area than in 1961.

The infestation near Okanagan Landing expanded to about 200 acres in 1962, but defoliation was not as uniformly heavy as on the smaller area infested in 1961. An experimental application of malathion on June 20 killed most of the larvae in the vicinity of 1961 damage, and in July virus disease apparently caused a general decrease in the population. Egg masses were found in parts of the infestation in October, however, and it is probable that patchy defoliation may occur in 1963.

Heavy defoliation occurred at two localities near Armstrong; one infestation was sprayed experimentally with DDT on June 20, and satisfactory control was achieved. The cumulative effect of 1961 and 1962 defoliation, however, will probably result in heavy tree mortality.

Many localized infestations ranging from one or two trees up to 20 acres occurred at Lavington, Armstrong, Larkin, Irish Creek, Vernon and at several localities in the Similkameen Valley between Hedley and Keremeos. Douglas-fir was the primary host but a few ponderosa pine growing with infested fir were heavily defoliated. Two blue spruce trees about 20 feet in height on the grounds of the Armstrong High School were infested, but Douglas-fir trees surrounding the School were not visibly affected.

In April 1962, egg sampling was conducted in many localities in an attempt to test a technique by which defoliation could be predicted on the basis of egg populations. Three branches were cut, with a pruning saw attached to an extension pole, from the mid crown of the selected trees. The foliage area of the entire branches, and the terminal three feet, was determined, and the number of egg masses on each sample counted. Trees were marked so that they could be identified later in the season and the degree of defoliation observed.

Results of the sampling were mostly inconclusive. The only sample trees appreciably defoliated in 1962 were those in the vicinity of high population areas. Dispersal of early instar larvae from heavily infested trees on to sample trees which had had low egg populations resulted in heavy defoliation in some cases. In other instances, sample trees with comparatively high egg populations suffered little or no defoliation, either because of larval dispersal or the effect of virus. These trees had been partly defoliated in 1961. Sampling at Irish Creek and near Hedley indicated that egg counts may predict defoliation more accurately in areas where none has already occurred, than in the vicinity of infestations that have already caused damage the previous year. The number of egg masses per 100 square feet of foliage on six trees at Irish Creek ranged from none to 15, with an average of three. No 1961 defoliation occurred in this area, but scattered trees in the vicinity were up to 85 per cent defoliated in 1962. At Hedley, where no visible damage had occurred in 1961, three open grown sample trees averaged 12 egg masses per 100 square feet, with a range of two to 23. A 20 inch d.b.h. tree that had 23 egg masses per 100 square feet was 10 per cent defoliated in 1962; defoliation was barely visible on a nine inch d.b.h. tree that had two egg masses per 100 square feet, and an 18 inch tree with 16 egg masses per 100 square feet was 20 per cent defoliated.

Two tree mortality plots established in 1961 in heavily defoliated stands at Okanagan Landing and on the Indian Reserve were examined in October 1962. A third plot near the southern boundary of the Indian Reserve was partially logged in 1962 and was abandoned. The following table compares results of 1962 examinations of the two plots, each of which consisted of 100 trees, with figures obtained in October 1961.

Plot	Number of trees			
	increased defoliation	decreased defoliation	No change	Dead
Okanagan Landing	62	2	28	8
Indian Reserve	8	58	28	6

Although the Okanagan Landing plot was sprayed with malathion on June 20, feeding by that date had been sufficient to result in 62 trees showing an increase in defoliation from the 1961 level; the trees had been heavily defoliated in 1961 and most of the 1962 foliage was consumed before the spray operation. The decreased defoliation on the Indian Reserve was believed to have resulted from a more extensive exodus of early instar larvae from the heavily defoliated trees than occurred at Okanagan Landing, and from the prevalence of disease which almost wiped out the populations in July. The number of dead trees is expected to increase on both plots in 1963. Thirty-two trees at Okanagan Landing and 31 on the Indian Reserve plot were completely defoliated in 1962, and most of these had lost more than 95 per cent of their foliage in 1961.

Pine Butterfly, Neophasia menapia Feld.

An infestation covering about 400 acres of open grown ponderosa pine near Okanagan Landing was discovered on July 28. Thousands of adults were flying around the trees and the presence of numerous dead butterflies and newly laid eggs indicated that the flight period had begun some days earlier. Considering the number of adults, defoliation was remarkably light; a few trees up to 60 feet in height had been almost stripped of all but the current year's foliage, but the average defoliation in the stand was barely noticeable. Scattered mature Douglas-firs within the infestation had no evidence of feeding. The flight period continued, with diminishing intensity, until about the third week of August. A few adults were emerging and living pupae were collected on August 9.

In order to ascertain the distribution of eggs on the host tree, an open-grown ponderosa pine 40 feet in height and 14 inches d.b.h. was felled on October 17, and the bole marked off in four equal lengths. The branches were removed, and the number of empty chrysalises and eggs counted. The number of branch tips bearing foliage was noted, as well as the occurrence of eggs on new (1962) or old foliage. Table 6 shows results of this work.

Table 6

Eggs of Pine Butterfly on a Ponderosa Pine Tree, Okanagan Landing, East Kamloops District, October, 1962

Location of samples	No. of branches	No. of tips bearing foliage	No. of chrysalises	No. of eggs		Av. no. of eggs per tip
				old foliage	new foliage	
Top quarter	19	132	245	2,565	3,652	47.1
Third quarter	21	314	615	6,818	7,547	45.7
Second quarter	28	807	901	12,336	9,428	27.0
Bottom quarter	15	688	369	4,929	4,350	13.5
Total	83	1,941	2,130	26,648	24,977	26.6

Most of the empty chrysalises were found among the needles or attached to twigs. The remainder were attached to the under side of the larger branches. In spite of the large number of chrysalises present, the tree had not been noticeably defoliated.

Predators had damaged many of the eggs, either by chewing the capsule, or less frequently, by puncturing the egg and apparently sucking out the contents. Table 7 shows the percentage of eggs destroyed by predators, and the average number of eggs per cluster on old and new foliage, at the four crown levels.

Table 7

Average Number of Pine Butterfly Eggs per Cluster and Percentage Predation, Okanagan Landing, East Kamloops District, October 1962

Location of sample	Av. no. eggs per cluster		Percentage destroyed by predators		
	Old foliage	New foliage	Old foliage	New foliage	Total
Top quarter	6.5	6.0	6.0	3.3	4.5
Third quarter	7.7	6.9	4.2	5.1	4.7
Second quarter	8.1	7.7	13.3	16.6	14.7
Bottom quarter	9.2	8.6	33.7	28.7	31.3
Average	7.9	7.3	14.0	13.3	13.7

It is noteworthy that the percentage of predation shown in Table 7 was lower in the upper branches than in those close to the ground. No evidence was obtained as to the identity of the predators; at the time that sampling was conducted no ants were present on the trees and the only predatory insects found were a few adults of Mulsantina sp.

The number of eggs per cluster ranged from one to 30, with an average of 7.6. Although single eggs were the most numerous "group," more eggs occurred in clusters of 12 than in any other single category.

Dissection of 30 newly emerged female butterflies by J. Holms showed that they contained an average of 54 fully developed eggs, and 55 partly developed ones.

Twelve trees scattered throughout the infestation and along its northern fringe were sampled in late October to determine the extent of possible defoliation in 1963. Four branches, one from each cardinal direction, were cut from the mid or lower crown with pole clippers. Height of the samples was about 28 feet. The foliated length of each branch, the number of tips bearing 1962 foliage, and the number of eggs were recorded. Results are shown in Table 8.

Table 8

Branch Sampling for Pine Butterfly, Okanagan Landing, East Kamloops District, October 1962

Tree no.	Total foliated length of 4 samples (ft.)	Total no. tips	Total no. eggs	Av. no. eggs Per foliated foot	Av. no. eggs Per tip	Percentage eggs destroyed by predators
1	12.0	17	781	65.1	46.0	0.5
2	10.0	11	691	69.1	62.9	2.3
3	5.3	11	182	34.1	16.5	50.0
4	5.7	19	232	40.7	12.2	12.9
5	8.0	12	20	2.5	1.7	90.0
6	7.2	16	140	19.4	8.8	32.1
7	7.8	10	147	17.6	13.7	43.8
8	8.8	13	62	7.0	4.8	0
9	8.2	16	104	12.7	6.5	0
10	7.8	16	902	115.6	56.4	4.0
11	6.8	16	1049	154.3	65.6	9.2
12	2.8*	13	222	77.9	17.1	0

*heavily defoliated in 1962

Trees 5 and 8, which had very few eggs, were situated on the northwestern edge of the stand and the remainder of the sample trees were scattered along the southeast-facing slope within the infestation. Destruction of eggs by predators was extremely variable, ranging from nil to 90 per cent on trees with a low to moderate population. On heavily infested trees predation was not as severe. It is expected that moderate to heavy defoliation will occur over much of the area in 1963, but that there will be no appreciable spread of the infestation.

Western Balsam Bark Beetle, *Dryocoetes confusus* Sw.

Infestations continued in a number of localities at medium and high elevations. There appeared to be increasing bark beetle infestations in the area extending from the headwaters of Ferry Creek to Aberdeen Lake, and north of Park Mountain. The infestations on Cherry Ridge and near Bolean Lake persisted. An attempt was made at the latter locality on July 12 to induce attack on two healthy trees, for the purpose of observing colour change and needle loss of infested trees. Male beetles, which enter the trees first, were placed in cages on the tree trunks. Unfortunately the mesh of the cages which had been designed for experiments with the Douglas-fir beetle was too large, and the *Dryocoetes* escaped.

Jack Pine Needle Miner, *Zelleria haimbachi* Busck

Some unusually severe and extensive infestations developed in lodgepole pine stands in the northern part of the District in 1962. The largest outbreaks were in the Paxton Valley area and in the neighbouring valleys of

Bolean, Charcoal and Chase creeks, where conspicuous discoloration occurred over about nine square miles. Damage was most severe in almost pure pole-sized and mature lodgepole pine stands between 2,800 and 3,500 feet elevation, and in most places appeared as an irregular reddish band along the valley sides. From 85 to 95 per cent of the current year's needles had been killed and webbed together; similar damage in 1961 had destroyed up to 30 per cent of that year's foliage. The population apparently collapsed in 1962. Hymenopterous parasite cocoons were numerous but it was not determined if parasitism was solely responsible for the decrease. Examination of branch samples taken at several localities in Charcoal Creek Valley in October failed to reveal the presence of any overwintering larvae, although empty mines in 1961 foliage were quite common.

Other infestations occurred in Equesis Creek Valley, near Falkland, between Glanzier and Kendry creeks near Armstrong, southeast of Enderby, and west of Scotch Creek near Celista. These infestations ranged up to several hundred acres in extent.

Less than five per cent of the lodgepole pine tips were infested at Yard Creek where a heavy infestation occurred in 1961.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

The only locality where noteworthy populations of hemlock loopers were found was at Hidden Lake. Six samples taken from western hemlock and western red cedar over a four square-mile area yielded an average of 32 larvae, compared with an average of 3.5 larvae per collection in 1961. On July 25, 1962, about half the larvae were in the last instar.

A second visit to the area was made on September 27. At 10:30 a.m. the onset of the first rain shower in two weeks stimulated the moths and probably resulted in many more being visible than would normally be the case during daylight. As many as 15 were visible at one time in openings along the edge of mature forest. No females were captured in flight but several dead ones were found on understory foliage.

Three branch samples were cut with pole clippers from the lower crown of trees growing at the edge of the stand close to Hidden Lake. The trees ranged from 14 to 18 inches d.b.h. and the branches, unlike most in the stand, were heavily festooned with a grey lichen, Alectoria probably sarmentosa Ach. Samples were taken at about 16 feet from the ground. One branch yielded no eggs; one had one egg per square foot of foliage and the third sample had 5.9 eggs per square foot. Two trees in the intermediate crown class were felled 200 yards from the fringe of the stand, but only one egg was found. The boles and branches of these trees, like most of those in the stand, were free of mosses and lichens.

Although no large concentrations of eggs were found, it seems possible that light infestations could develop in the Hidden Lake area in 1963.

False Hemlock Looper, Nepytia canosaria Wlk.?

False hemlock loopers increased in most areas in 1962. They were present in 79 per cent of all Douglas-fir samples taken during the larval period, which in 1962 was considered to extend from May 30 to August 10. Unusually high populations were noted at Okanagan Landing on the edge of a Douglas-fir tussock moth infestation; 104 larvae were collected in one 3-tree sample. A maximum of 37 larvae was collected from open-grown Douglas-fir near Harris Creek, and 23 from the same host at Cyama. Table 9 compares sample data for collections taken from Douglas-fir in 1961 and 1962.

Table 9

Three tree Beating Collections of False Hemlock Looper from Douglas-fir, East Kamloops District, 1961 and 1962

Drainage division	Total collections during larval period		Percentage of collections containing larvae		Av. no. larvae per positive sample	
	1961	1962	1961	1962	1961	1962
180	9	3	44	33	4.2	17.0
181	33	28	61	77	4.8	10.7
182	3	3	0	67	-	23.5
183	2	7	0	71	-	4.8
184	10	12	50	100	3.0	4.2
Totals	48	53	56	79	4.3	9.5

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Infestations continued without any notable change in 1962. Five plots were sampled to determine percentage of foliage infested, and the survival of the 1962 generation. Information in tables 10 and 11 was derived from examination of leaves from two 12-inch branches cut from each of five trembling aspen trees at each locality. Although the percentage of leaf surfaces mined was lower than in 1961 at three of the five plots, the number of adults produced per leaf surface increased at four of the five localities.

Table 10

Aspen Leaf Surfaces Mined and Number of Adults Produced in Samples, East Kamloops District, 1959-1962

Location	Percentage of leaf surfaces with mines				No. of adults per leaf surfaces			
	1959	1960	1961	1962	1959	1960	1961	1962
Carlin	82	41	91	65	0.24	0.11	0.26	0.20
Phillips Lake	71	86	94	61	0.19	0.32	0.02	0.19
Falkland	74	14	66	47	0.16	0.01	0.04	0.21
McCulloch Road	-	-	19	51	-	-	0.02	0.17
Aspen Grove	-	-	33	40	-	-	0.08	0.09

Table 11
Mortality of Aspen Leaf Miner in 100-cocoon Samples, East Kamloops District, 1959-1962

Location	Percentage mortality							
	Parasitism				Other causes			
	1959	1960	1961	1962	1959	1960	1961	1962
Carlin	25	29	82	22	2	4	15	6
Phillips Lake	18	21	62	32	4	12	11	7
McCulloch Road	16	36	76	35	5	3	15	8
Falkland	-	-	66	28	-	-	13	10
Aspen Grove	-	-	7	17	-	-	25	24

Seasonal development in the warmer locations began early; the first eggs were found near Vernon on April 17. The onset of cold weather early in May slowed larval development and the first cocoons were found on May 29. On May 30 moths were still oviposition on newly flushed aspen leaves at 2,800 feet elevation near Pillar Lake.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Larvae of the one-year-cycle budworm were scarcer in Douglas-fir and western hemlock than in 1961. Only 15 per cent of Douglas-fir collections taken during the larval period (June 4 to August 12) contained larvae.

A flight of budworm moths, presumably of the two-year-cycle form, appeared in Vernon on the night of August 1. The following morning moderate numbers of moths were observed on the walls of business premises where they had been attracted by lights. No infestations were known in the District; populations at Bolean Lake, where a chronic infestation persisted for many years, were extremely low in 1962.

Black-headed Budworm, Acleris variana (Fern.)

Very few larvae were collected in 1962.

Larch Sawfly, Pristiphora erichsonii Htg.

Five colonies of larvae were collected from four western larch trees at Lavington, and curled tips were found on a tree near Enderby. No larvae had been collected in the District since 1950.

Spotless Fall Webworm, Hyphantria cunea Drury

Tents were abundant throughout the Okanagan Valley but infestations were not quite as heavy in the Kelowna district as in 1961.

A two-mile roadside strip was established on August 20 at Woodsdale to replace the strip at Duck Lake which was discontinued in 1961 because of road alterations. Table 12 shows the number of tents counted on roadside trees and shrubs on both sides of a two-mile piece of road from Woodsdale (Wageman Road) to the Beaver Lake road.

Table 12

Spotless Fall Webworm Strip Counts, Woodsdale, East Kamloops District, August 20, 1962

Host	Number of tents per mile		Average per mile
	Mile 0-1	Mile 1-2	
Chokecherry	89	240	164.5
Mountain alder	141	25	83.0
Crabapple	9	22	11.0
Black cottonwood	8	3	5.5
Rose	2	3	2.5
Weeping willow	2	1	1.5
White birch	2	0	1.0
Black walnut	0	2	1.0
Trembling aspen	1	0	0.5
Pear	1	0	0.5
Saskatoon	1	0	0.5
Totals	256	296	271.5

Satin Moth, <u>Stilpnotia</u> <u>salicis</u> L.

Moths were commonly attracted to lights in the North Okanagan in June and July but there were few noteworthy infestations. Defoliation of trembling aspens near Brash Creek was a little lighter than in 1961, but noticeable damage extended for three quarters of a mile along the mountainside. A windbreak of Lombardy poplars was partially defoliated in Coldstream Municipality.

Pine Needle Scale, <u>Phenacaspis</u> <u>pinifoliae</u> Fitch

Infestations in ponderosa pine persisted at many localities in the Okanagan Valley. Most extensive damage was noted at West Summerland, Penticton, Glenmore, Carr's Landing and Whiteman Creek.

Ponderosa pines between Penticton and Naramata which were heavily infested by this species and the black pine leaf scale prior to 1960 continued to recover. The upper crowns of many pole-sized and mature trees appeared quite healthy but the branches of the mid-crowns had been so severely damaged that many died.

Black Pine Leaf Scale, <u>Nuculaspis</u> <u>californica</u> (Cole.)

Light infestations persisted in ponderosa pine stands near Skaha Lake and Penticton. A very light population was noted on a ponderosa pine near Okanagan Landing.

Spruce Spider Mite, <u>Oligonychus</u> <u>ununguis</u> (Jacot.)

The infestation in Douglas-fir stands south of Okanagan Landing was not as heavy as in 1961, but some discoloration was evident in late summer. Mites were abundant locally on Douglas-fir near Vernon and Monte Creek, and on Douglas-fir and Rocky Mountain juniper at two places on Shuswap Lake.

Poplar and Willow Borer, <u>Sternochetus</u> <u>lapathi</u> L.

Heavy infestations persisted in the Enderby-Shuswap Lake area in willows and, less frequently, black cottonwood and Sitka alder. Poplar and willow borers were scarce in the South Okanagan, and in the western part of the District, except for the Skagit Valley in Manning Park; however, willows near Tulameen were about 10 per cent infested. Willows at 4,200 feet on Terrace Mountain and at 4,000 feet at Chute Lake above Naramata were infested.

Alder Sawfly, <u>Hemichroa</u> <u>crocea</u> Fourcr.

Groups of mountain alders up to 25 feet in height were stripped over about three acres near Winfield before the end of June. A few Sitka alders near Hidden Lake were partly defoliated and larvae were collected from the same host at Paxton Valley and Manning Park.

Hemlock Sawfly, Neodiprion sp.

Light defoliation was observed at six places in mature western hemlock stands near Hidden Lake, on July 25. Most of the larvae had spun up.

Sawflies on Douglas-fir, Neodiprion spp.

No noteworthy damage was observed in 1962, but larvae were taken in 64 per cent of the quantitative collections during the larval period (June 7 to August 6). Positive collections averaged 21.2 larvae.

Flea Beetles, Altica spp.

Flea beetles on mountain alder and black cottonwood increased in 1962 and damage became obvious during July in many localities in the North Okanagan and Shuswap Lake districts. Groves of cottonwoods bordering lakes and rivers in the Enderby, Sicamous and Chase areas were noticeably discoloured.

Douglas-fir Needle Midges, Contarinia spp.

Heavy infestations recurred at several places in the drier valleys in 1962. Damage to 80 per cent or more of the needles was observed at Ashnola River, Hedley, Princeton, Peachland, Monte Creek, Mission Creek and at several North Okanagan localities.

Cooley's Spruce Gall Aphid, Adelges cooleyi Gill.

Infestations on Douglas-fir were not as heavy as in 1961, but no change was observed in the number of galls formed on Engelmann spruce. Young spruce trees in Charcoal Creek Valley were heavily infested; adults were emerging at this locality (elevation 2,800 feet) on August 7. Many of the galls on trees up to 15 feet in height had been picked off and torn apart by rodents. Piles of opened galls were found on stumps and logs nearby.

A Scolytid in Black Cottonwood, Cryphalus salicis Hopk.

Dieback of the branches in the upper crowns of black cottonwoods was caused by infestations of this tiny scolytid at Westwold, Okanagan Centre, Squilax, and near Princeton. Specimens were identified by Mr. G. R. Hopping of the Calgary Forest Insect Laboratory. Although this species causes extensive dieback of black cottonwood, it apparently has not been reported previously from this host.

European Pine Shoot Moth, Rhyacionia buoliana (Schiff.)

A mined leader was collected in 1962 from a mugho pine in Kelowna which had also been infested in 1961. An inspection of nurseries and a few ornamental plantings in the Okanagan Valley failed to produce any further evidence.

A Pine Shoot Borer, Eucosma sonomana Kft.

About 10 per cent of young lodgepole pine growing in an old field near Pillar Lake were infested. Most of the larvae had left their mines by August 7. A few ponderosa pines were infested near Silver Creek.

A Birch Leaf Blotch Miner, Lyonetia saliciella Busck.

A light infestation persisted at Sugar Lake. On June 28, fully grown larvae were descending on silk threads from white birch trees close to the lake shore.

A Ponderosa Pine Cone Borer, Dioryctria auranticella (Grote)

Only one ponderosa pine cone collection was taken in 1962. Less than three per cent of 35 mature cones examined at Kirton were infested. The cone crop was moderate to heavy in most parts of the District in 1962.

A Sawfly, Xyela sp.

The ponderosa pines which were used to record emergence of Xyela larvae from staminate flowers in 1961 produced no flowers in 1962.

MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
Ips oregoni (Eich.)	Py	0	no infestations in 1962
Magdalis lecontei Horn.	Py	1	adults damaging foliage, Falkland
Malacosoma pluviale Dyar	chokecherry	1	first larvae Apr. 18

Insect	Host	No. of collections	Remarks
Platypedia areolata (Uhl.)	-	1	locally abundant
Rhabdophaga swainei Felt	Se	1	Bolean Lake
Taniva albolineana (Kft.)	Se	1	quite common, Manning Park
Trypodendron lineatum (Oliv.)	-	0	no reports of damage in 1962

STATUS OF FOREST DISEASES

Melampsora Rust of Trembling Aspen

Surveys of Melampsora rust on trembling aspen and hard pines were conducted in 1962, as part of a province wide study of the relationship of rusts of aspen to a rust affecting pine seedlings at Telkwa.

Foliage of ponderosa pines was examined at several places where heavy rust infections had occurred in 1961 on trembling aspen. No infected pines were found. Twelve freshly sprouted ponderosa pine seedlings near Armstrong and six near Okanagan Centre were also free of infection.

A survey for the occurrence of the uredinial stage on trembling aspen was conducted in late summer. Fifty leaves on each of three trees were examined at each locality sampled, and the infections classed as light, medium or heavy. With the exception of a few places where no infections were found, Melampsora was found to be quite generally distributed throughout the District. Heaviest infections were recorded at Whipsaw Creek and Ashnola River.

A Needle Cast of Ponderosa Pine

Some heavy infections of Elytroderma deformans (Weir) Darker were noted on ponderosa pine stands in 1962 but none was very extensive. Some noteworthy areas of infection were the lower part of Hayes Creek Valley near Princeton, Falkland, Westwold, Lambly Creek, and on the Commonage south of Vernon.

Two plots established in 1960 near Carr's Landing and Glenemma were visited in August 1962 to record the intensity of infection on the tagged trees. The following table shows the change in status of the disease since the plots were examined in 1961.

Locality	No. of trees living 1961	Percentage of trees			Dead since 1961
		Increased infection	Decreased infection	No change	
Carr's Landing	66	68	23	6	3
Glenemma	56	18	66	16	0

Eleven trees have died on the Carr's Landing plot and five at Glenemma since the plots were established in 1960. Estimated foliage infection for all trees in the Carr's Landing plot rose in 1962 from 30 to 41 per cent, while at Glenemma it declined from 37 to 30 per cent.

Needle Cast of Western Larch

Infections of Hypodermella laricis Tub. were much more severe than in 1961, in the Enderby and Lumby Ranger districts. Particularly intense discoloration occurred near Hupel, south of the Shuswap River.

A Dwarf Mistletoe on Engelmann Spruce

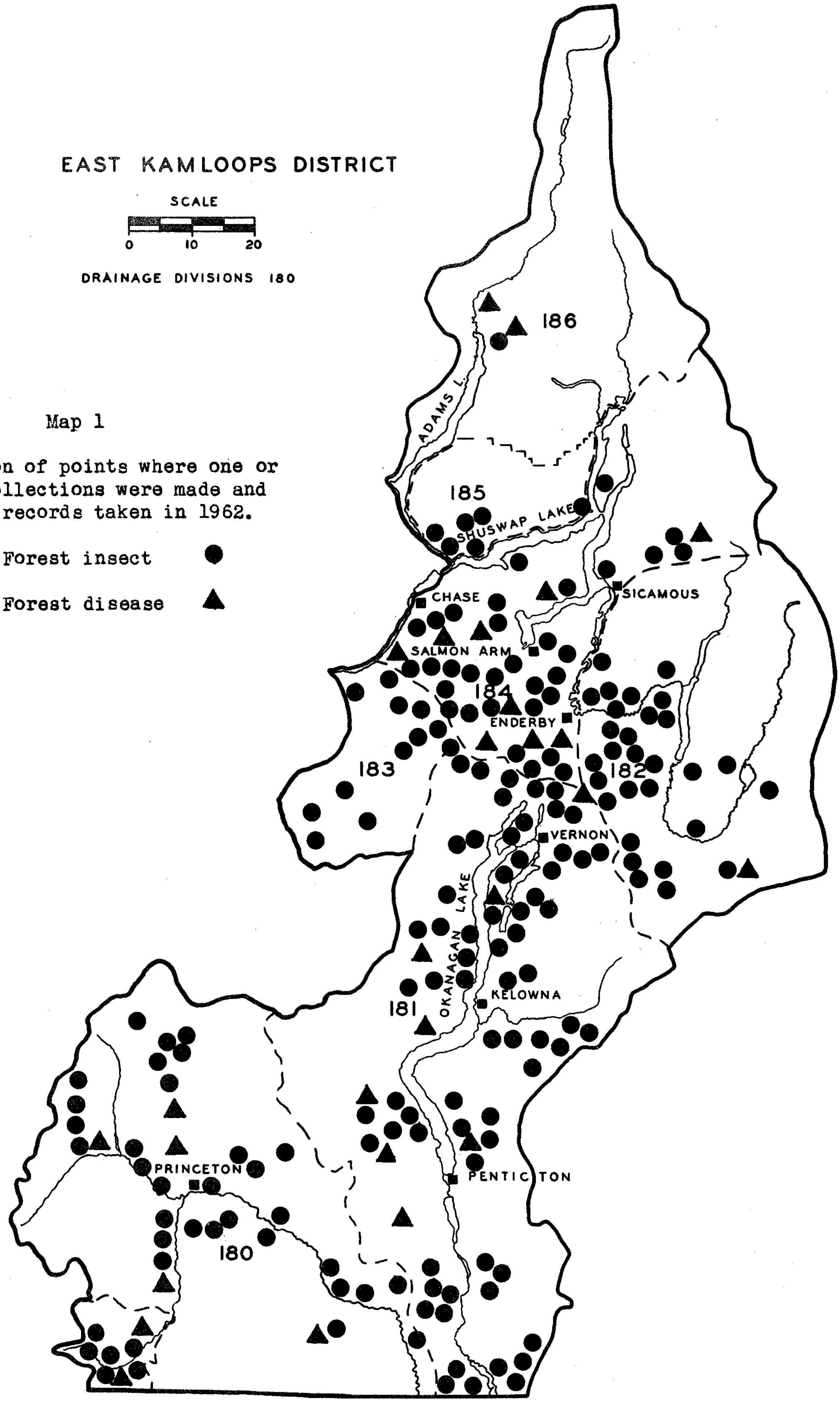
A single Engelmann spruce 10 inches d.b.h. near the confluence of Castle Creek and the Similkameen River had about 40 brooms caused by Arceuthobium americanum Nutt. The tree had probably been infected from lodgepole pines in the vicinity.

Exotic Plantations

The following table shows the status of trees on exotic plantations visited in 1962.

XP No.	Locality	Tree Species	Remarks
59	Westwold	Scots pine	1 tree recovering from porcupine damage
		white spruce	normal
		western larch	normal
60	Westwold	white elm	some broken branches
62	Pritchard	Scots pine	3 trees living

XP No.	Locality	Tree Species	Remarks
		ponderosa pine	5 healthy; one infected with Elytroderma deformans (Weir) Darker; 2 damaged by porcupines and infested with Dendroctonus monticolae Hopk.
219	Knox Mountain Kelowna	red pine	very low survival
220	Lambly Creek	Scots pine	survival not determined
221	Lambly Creek	European larch hybrid larch	no living trees found
222	Tamarack Lake	Scots pine	few survivors; some trees browsed by cattle or deer
223	Terrace Mountain	European larch hybrid larch	no trees found



Map 1

Location of points where one or more collections were made and field records taken in 1962.

Fig. 1. Magdalis lecontei Horn. adult perching on a ponderosa pine needle, Murray Creek, West Kamloops District, August 1, 1962. J. Grant.

Fig. 2. Punctures in ponderosa pine needles made by feeding adults of Magdalis lecontei Horn., Murray Creek, West Kamloops District, August 1, 1962. J. Grant.

Fig. 3. Ponderosa pine foliage damaged by adults of Magdalis lecontei Horn., Falkland, East Kamloops District, August 21, 1962. J. Grant.

FOREST INSECT AND DISEASE SURVEY

CENTRAL KAMLOOPS DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

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R. J. Andrews

INTRODUCTION

Field work in the Central Kamloops District began on May 2 and ended October 30. A total of nine hours flying time, eight of which were contracted by the Vernon Laboratory, and one hour through the courtesy of the British Columbia Forest Service, were used for bark beetle surveys within the District.

A total of 362 insect and 49 tree disease collections were taken in the Central Kamloops District. Collections from trembling aspen for a study on distribution of Melampsora spp. in the Pine Twist Rust Survey were made in the southern portion of the District.

Table 1 shows the collections by hosts. Map 1 shows the locations where one or more collections were made and field records taken in 1962.

Table 1

Collections by Hosts

Central Kamloops District, 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	6	-	Alder, mountain	5	-
Douglas-fir	165	4	Aspen, trembling	12	23
Fir, alpine	22	2	Birch spp.	11	-
Hemlock, western	22	-	Cherry, choke	3	-
Juniper, common	3	-	Cottonwood, black	2	9
Juniper, Rocky Mtn.	9	-	Willow spp.	10	1
Pine, lodgepole	14	1	Poplar, white	-	5
Pine, ponderosa	13	1	Miscellaneous	21	-
Pine, western white	2	-			
Spruce, Engelmann	42	3	Total	64	38
Total	298	11	Grand total	362	49

STATUS OF INSECTS

Douglas-fir Beetle, <u>Dendroctonus pseudotsugae</u> Hopk.

Generally, attacks by the Douglas-fir beetle were lighter than in 1961. A substantial decrease in the number of beetle-killed red-topped trees was noted. This is probably due to the fact that some of the attacked trees had turned red in 1961, and the 1962 attacked trees had not started to turn color by late fall. Table 2 shows the results of counts made from vantage points and aerial surveys of trees damaged by the Douglas-fir beetle from 1959 to 1961.

Table 2

Douglas-fir Trees Killed by Douglas-fir Beetle from 1959 to 1961 as Determined in 1962, Central Kamloops District

Locality	No. of dead trees	Av. volume per tree (cu. ft.)	Est. volume of timber (cu. ft.)
Highland Valley	573	90	51,570
Douglas Plateau	575	50	28,750
Bonaparte Plateau	890	90	80,100
Tranquille For. Res.	343	100	34,300
Niskonlith For. Res.	144	80	11,520
Walhachin	135	90	12,150
Total	2,660		218,390

Four plots were located where one or more trees had been attacked by bark beetles in 1961. Live beetles were collected and virgin females were caged on May 22 on overmature trees most susceptible to attack for color change and induced attack studies. Inspection at the end of May revealed all beetles caged had entered the bark. Further observations on June 29 revealed a complete failure of caged beetles in attracting further attack and showed that all the caged beetles had been killed by pitch flow.

In May, 1962, a large number of specimens were collected with the bark and placed in plastic bags in a cold storage room for distribution to members of the ranger staff wishing to conduct a similar study. Some of the beetles were used but a large portion of the population was left in the cold room which was kept at a constant 40° Fahrenheit. In November, 1962, examination of the bark revealed an active and apparently healthy population. The survival of the beetles under these adverse condidions was unexpected.

Mountain Pine Beetle, <u>Dendroctonus monticolae</u> Hopk.

Increased tree mortality from mountain pine beetle depredations was noted in all 1961 damaged areas. Near Blue River, 350 red-topped western white pine trees were counted.

The Barriere lakes infestation was observed from the air and an estimated 1,000 white pine trees had been killed. This was an increase of 70 per cent compared with 1961.

Two hundred red-topped lodgepole pines were counted near Bulman Mountain on the Douglas Plateau.

Tree damage in the Chapperon Lake area in 1961 was attributed to a combined attack by the Oregon pine engraver and the mountain pine beetle. Inspection of the attacked trees in September, 1962, revealed that while the population of the Oregon pine engraver had decreased, the mountain pine beetle population had increased. The 1962 attack was particularly heavy. The stand formation is generally pole-sized trees ranging in diameter from three to 14 inches with scattered overmature trees. Samples from trees of all sizes revealed a heavy population of the mountain pine beetle and light populations of western pine beetle, Dendroctonus brevicomis Lec. and the Oregon pine engraver, Ips oregoni (Eich.).

The following table shows the results of a strip cruise of two chains by 86 chains (17.2 acres) near Chapperon Lake:

Total volume (cu. ft.)	Av. vol per acre (cu. ft.)	Percentage of stems			
		Healthy	Old grey	Red	1962 attack
23,050	1,340	37	4	28	31

The number of trees per acre and their average volume and diameter by attack category are shown in Table 3.

Table 3

Healthy and Mountain Pine Beetle-Infested Ponderosa Pine, Chapperon Lake, Central Kamloops District, 1962

	Av. no. trees per acre		Av. d.b.h. (in.)	Av. vol. (cu. ft.)
Healthy	52.6		11.0	8.9
Old grey	8.2		8.5	9.1
Red	40.0		8.4	7.0
1962 attack	44.0		8.2	7.4
Total	144.8	Average	9.0	8.1

In addition to the strip cruises near Chapperon Lake, a spraying project was carried out during the latter part of September to determine the effectiveness of ethylene dibromide in controlling mountain pine beetles infesting ponderosa pine. Spray consisting of one part emulsion of 3.75 lbs. ethylene dibromide, three per cent Triton X151 and one imperial gallon of diesel oil to four parts water, was applied to the infested logs. Weather conditions, during and following the spraying, were suitable with temperatures ranging from 70° to 80° Fahrenheit. Ten green infested trees were felled and sprayed with the solution. The spray was applied heavily enough to give a thorough wetting and still prevent waste by runoff. The surface area of the trees was determined, and the amount of spray applied per square foot was less than the recommended dosage of one gallon per 80 to 100 square feet. The initial application of spray was not heavy enough so five of the test logs were resprayed to bring the application up to the recommended dosage.

Table 4 shows the measurements and the area sprayed of 10 ponderosa pine trees, Chapperon Lake, 1962.

Table 4

Ponderosa Pine Logs Experimentally Sprayed for Mountain Pine Beetle, Chapperon Lake, 1962

Log no.	Basal diameter	Length of section sprayed	Area sprayed (sq. ft.)
1	12.5	33	77.5*
2	11.0	27	51.3*
3	14.0	25	65.0*
4	13.0	31	83.7*
5	11.5	27	62.1*
6	10.5	28	61.6
7	12.2	40	92.0
8	12.0	27	60.1
9	11.0	33	72.6
10	16.0	32	103.6
Total			729.5
Average	12.3	30.3	72.9

* These logs were resprayed.

Five additional trees were felled and two square foot samples taken from three portions of the stem to ascertain stages of larval development and population density at the time of spraying. The five double sprayed logs were sampled in the same manner some four weeks later. The following table shows the comparison of records taken from the treated and untreated logs.

	No. of samples containing larvae	Av. no. larvae per sq. ft.		Percentage mortality
		living	dead	
sprayed	16	134.0	14.6	8.0
unsprayed	7	281.7	0	0

The table shows that although ethylene dibromide was applied to ponderosa pine logs in the dosage recommended for Douglas-fir, it failed to give satisfactory control of the mountain pine beetle. It is therefore suggested that use of ethylene dibromide at the prescribed formulation should not be recommended against the mountain pine beetle in ponderosa pine until further trials have been made.

Western Pine Beetle, Dendroctonus brevicomis Lec.

Very few ponderosa pine were killed by the western pine beetle in 1962. A light population was associated with the mountain pine beetle near Chapperon Lake and thirteen trees were killed northeast of Heffley Creek.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Decked spruce logs near Jamieson Creek had been lightly attacked by this bark beetle but no infested trees were located. There were no reports of Engelmann spruce beetle infestations in the North Thompson River valley during 1962.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

There was an increase in western balsam bark beetle activity near Knouff Lake and the headwaters of Whitewood, Jamieson and Watching creeks. An estimated 675 trees were killed near Knouff Lake in 1961; in 1962, 800 red-topped trees were counted. Near the headwaters of Whitewood, Jamieson and Watching creeks, 525 trees were counted in 1961. In 1962, 2300 red-topped trees were recorded. Heavy populations were noted in ten sample trees near Jamieson Creek.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

The hemlock looper population in Douglas-fir stands remained low in the Central Kamloops District although there was an increase in the number of larvae collected. Only three per cent of the Douglas-fir collections contained larvae in 1961. In 1962, 20 per cent of the collections contained an average of 1.9 larvae.

In the hemlock-cedar forests of the North Thompson River Valley the average number of larvae per collection from western hemlock was 5.3. Twenty-four per cent of the random beating samples taken from Blue River to Gosnell contained hemlock looper larvae.

A mass collection of 1,000 larvae was obtained on July 25 from western red cedar and hemlock near Pyramid. Larvae ranging from third to fifth instar were sent to Dr. O. Morris of the Victoria Laboratory for virus research and mass cultures.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Populations of the one-year-cycle spruce budworm increased generally throughout the District with two localities yielding 10 or more larvae per collection. Thirty-six per cent of the 102 Douglas-fir collections made throughout the District yielded an average of 3.9 larvae, an increase over the 1961 average of one larva per positive collection. At Stump Lake a maximum of 10 larvae per sample was taken from Douglas-fir; near Lac le Jeune the maximum number of larvae from the same host was 16.

The occurrence of the two-year-cycle spruce budworm attained higher than average proportions south of Valemount ~~and near Jamieson Creek~~. Twelve collections were made from Engelmann spruce and alpine fir between Valemount and Canoe Springs. All the collections contained larvae, with an average of three larvae per 3-tree beating sample. Populations were higher at Jamieson Creek where thirteen collections from Engelmann spruce and alpine fir averaged 8.7 larvae.

False Hemlock Looper, Nepytia canosaria Wlk?

Above average false hemlock looper populations occurred at three localities in 1962. Maximums of 23 larvae were collected in three-tree Douglas-fir samples near Agate Bay and McGillivray Lake, and 17 larvae from the same host near Copper Creek. Of 86 Douglas-fir collections, taken during the larval period, 32 per cent contained an average of 11.9 larvae.

Black-headed Budworm, Acleris variana (Fern.)

Populations of the black-headed budworm remained at a low level throughout the District.

Satin Moth, Stilpnotia salicis (L.)

A substantial decrease in the number of defoliated aspen groves was noted throughout the range of the satin moth in the Central Kamloops District in 1962. Forty defoliated groves were noted from Shumway Lake south to Nicola Lake. In this same area 105 groves suffered severe defoliation in 1961. A trace of 1962 defoliation was observed in the following areas: Pritchard, Squilax, Brigade Lake, Campbell Range and Monte Creek to Kamloops. A possible explanation for this decrease could be the long period of inclement spring weather.

Although defoliation was light, a heavy moth flight occurred in the Kamloops-Monte Creek area in the latter part of July. Large numbers of moths were attracted to neon signs and street lights.

Forest Tent Caterpillar *Malacosoma disstria* Hbn.

Heavy forest tent caterpillar defoliation of aspen and black cottonwood occurred from Valemount south along the Canoe River for 20 miles and southwest along Camp Creek to Albreda. Three plots, two of which were established in 1962, were sampled in the defoliated area. The two sampling techniques, on which predictions of defoliation severity in 1963 are based, were sequential and mass collection of egg masses. The sequential sampling method requires the cutting of two branches from the top four branches of the tree, exclusive of the terminals. These are branches which extend to the top of the canopy. The outer 18 inches are cut off and the number of egg masses counted. This is repeated until the cumulative number of egg masses falls into one of the defoliation classes.

The mass collection method requires the felling of three trees and counting the total number of egg masses on each tree.

In two plots only the three trees required for mass collections were needed to categorize the infestation by the sequential method. In the third plot, located four miles north of Albreda, 12 trees had to be felled in order to determine the degree of infestation. If an unusually high number of egg clusters had not occurred on one tree the felling of more trees would have been necessary. Table 5 shows the data collected from the standard three-tree method and Table 6 contains the data collected from the sequential sampling method. Heavy defoliation is predicted for 1963 in the areas sampled.

Table 5

Forest Tent Caterpillar Egg Masses Collected from Trembling Aspen and Predicted 1963 Defoliation, Central Kamloops District, 1962

Locality	Tree d.b.h. (ins.)	Tree height (ft.)	Crown length (ft.)	Total no. of egg masses	Predicted defoliation
5 Mi. S. of Valemount	4	36	15	40	
	5	36	12	52	
	6	45	18	124	
Average	5	39	15	72	heavy
17 Mi. S. of Valemount	6	69	21	97	
	9	81	18	189	
	10	81	27	217	
Average	8	77	22	167	heavy
4 Mi. N. of Albreda	4	39	12	7	
	5	39	15	24	
	4	32	18	15	
Average	4	36	15	15	heavy

Table 6

Predicted Forest Tent Caterpillar Defoliation Severity Based on a Sequential Sampling Method, Central Kamloops District, 1962

Locality	Av. tree d.b.h. (ins.)	Av. tree height (ft.)	Av. crown length (ft.)	No. of trees sampled	Predicted defoliation
5 Mi. S. of Valemount	5	36	15	2	heavy
17 Mi. S. of Valemount	8	77	33	3	heavy
4 Mi. N. of Albreda	4	46	15	12	heavy

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Larvae were common on willow, trembling aspen, birch and wild rose throughout the District.

Spotless Fall Webworm, Hyphantria cunea Drury

A further decline in the number of tents was evident at Spences Bridge and Savona. This downward trend has been noted since 1959. In August, the number of tents were counted on various hosts from a slow-moving vehicle for three miles west of Savona and for seven miles east of Spences Bridge. Results are shown in Tables 7 and 8.

Table 7

Spotless Fall Webworm Roadside Counts, Savona Cut-off from East to West, Central Kamloops District, August, 1962

Host	No. of webs per mile			Average per mile
	Mile 0-1	1-2	2-3	
Chokecherry	0	0	0	1
Black cottonwood	0	2	2	1.3
Apple	0	0	0	0
Lombardy poplar	0	0	0	0
1962 totals	0	2	2	1.3
1961 totals	43	5	2	16.7
1960 totals	64	30	9	34.3
1959 totals	178	41	19	79.3
1958 totals	524	135	150	269.7

Table 8

Spotless Fall Webworm Roadside Counts, Spences Bridge to Seven Miles Southeast along the Nicola River, Central Kamloops District, August 1962

Host	Mile 0-1	1-2	2-3	3-4	4-5	5-6	6-7	Av. per mile
Black cottonwood	7	0	7	3	22	12	5	8.0
Chokecherry	8	0	2	0	13	8	0	4.4
Mountain alder	0	0	0	0	4	0	0	0.6
Saskatoon	4	0	2	4	0	0	5	2.1
Wild rose	0	0	0	0	0	0	0	0.
1962 totals	19	0	11	7	39	20	10	15.2
1961 totals	56	1	11	9	66	26	14	28.1
1960 totals	146	9	42	23	31	14	28	41.9

Douglas-fir Tussock Moth, Orgyia pseudotsugata (McD.)

Only four larvae were collected from Douglas-fir in 1962. Areas where severe outbreaks had been reported in 1947 and 1949 were examined with negative results.

A Sawfly on Lodgepole Pine, Neodiprion sp.

A survey of the infestation of a sawfly on lodgepole pine near Squilax revealed a total collapse of the population in 1962. Damage to pole-sized lodgepole pines has been reported in this area since 1957.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Random samples and observations made at permanent sampling points along the Thompson River indicated a light population on ponderosa pine in this area.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Willows in the valley bottom from Kamloops to Clearwater were heavily attacked by this weevil again in 1962.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Decrease of aspen leaf miner populations continued in 1962. One plot only showed a slight increase of mined leaf surfaces. The number of infested leaf surfaces and the number of adults produced per leaf surface in samples taken from five plots for the last three years are shown in Table 9. Table 10 indicates the percentage of mortality in 100 randomly selected cocoons at each location.

Table 9

Aspen Leaf Surfaces Mined and Number of Adults Produced per Leaf Surface, Central Kamloops District, 1960, 1961 and 1962

Location	Percentage of leaf surfaces with mines			No. of adults produced per leaf surface		
	1960	1961	1962	1960	1961	1962
Cache Creek	47	43	25	0.21	0.01	0.05
Paul Creek	56	86	19	0.30	1.09	0.07
Campbell Range	20	16	24	0.10	0.09	0.11
Coldwater River	81	49	25	0.60	0.01	0.08
Deadman River	73	67	15	0.37	0.07	-

Table 10

Mortality of Aspen Leaf Miner in 100-cocoon Samples, Central Kamloops District, 1960, 1961 and 1962

Location	Percentage mortality					
	Parasitism			Other causes		
	1960	1961	1962	1960	1961	1962
Cache Creek	21	62	17	1	3	11
Paul Creek	0	6	13	9	2	17
Campbell Range	25	5	18	9	9	12
Coldwater River	25	80	8	4	4	4
Deadman River	18	54	-	9	3	-

An additional plot was established near Campbell Lake in two adjoining aspen groves to compare the intensity of attack on early-opening trees with that in late opening groves. The trees in the groves were similar in diameter and height but varied approximately two weeks in leaf development. The groves were designated as north and south; the north grove preceded the south grove by two weeks in bud opening. The early, or north plot, shows a heavier infestation with a lower survival rate. The attack intensity by the aspen leaf miner for the two groves is shown below.

Plot	Total leaves examined	Percentage of leaves mined	Percentage of surfaces mined	Cocoons per 100 infested leaf surfaces
North (early)	367	92	67	79
South (late)	457	37	19	84

A Leaf Miner, Lyonetia sp.

Western white birch leaves were heavily mined south of Valemount to Albreda and south along the Canoe River to Boat Encampment. The infestation is now continuous from the South Prince George District to the infested area of the Big Bend.

Oregon Fir Sawyer, Monochamus oregonensis Lec.

On July 26 a report of Oregon fir sawyer on Timber Sale X673999, northwest of Barriere, was received from the British Columbia Forest Service at Kamloops. Investigation revealed a heavy flight of Monochamus oregonensis Lec. The large population had built up in the Engelmann spruce cull logs and slash of previous years' logging and was attacking logs which were being skidded, decked and trucked at the time of inspection. A later examination of the logs at the mill-site showed only a trace of larval activity.

A medium to heavy population of the Oregon fir sawyer infested burned over slash and small diameter trees within the confines of the Jamieson Creek Tree Farm.

Green Striped Forest Looper, Melanolophia imitata Wlk.

In a total of 104 collections from Douglas-fir taken between June 14 and August 9, 1962, 40 per cent contained an average of two larvae. During 1961, 38 per cent of the collections contained an average of 2.3 larvae.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

A light population of pine needle scale continued to attack immature ponderosa pine for several miles along the Mamette Lake road, north of Lower Nicola.

Black Pine Leaf Scale, Nuculaspis californica (Cole)

A trace of black pine leaf scale was associated with a light infestation of the pine needle scale two miles north of Lytton. This is the first record of occurrence in that vicinity.

A Sawfly, Xyela sp.

A poor crop of staminate flowers was produced by ponderosa pine trees in 1962. At two locations, Kamloops and Merritt, lack of sufficient flowers necessitated abandoning infested flower counts. This scarcity of flowers was reflected in light populations of Xyela sp. and in low percentages of infested clusters. Table 11 shows the percentage of flowers infested and the locations where samples were taken.

Table 11

Percentage of Ponderosa Pine Staminate Flowers Infested by Xyela sp., Central Kamloops District 1960, 1961, and 1962

Location	Percentage flowers infested		
	1960	1961	1962
Mamette Lake Road	18	93	6
Nicola	9	71	4
Savona	65	73	29
Little Shuswap	-	-	1

The following table shows the number of flowers examined and percentage infested from 1958 to 1962:

Year	1958	1959	1960	1961	1962
No. flowers examined	483	474	320	452	368
Percentage flowers infested	39	38	25	58	10

Jack Pine Needle-miner, Zelleria haimbachi Busck

Three hundred acres of lodgepole pine trees were heavily attacked by the jackpine needle-miner near Louis Creek. Nearly 100 per cent of the current year's foliage was infested. Heavy parasitism was indicated by scarcity of pupae in the defoliated area; clusters of parasite cocoons were noted in the needle bundles and in bark crevices.

A lighter population caused up to 50 per cent defoliation near Campbell Lake. Here again parasitism was heavy.

Mourning Cloak Butterfly, Nymphalis antiopa (L.)

Larvae of the mourning cloak butterfly were common on willow in the North Thompson Valley and throughout the western portion of Chase Ranger District.

OTHER NOTEWORTHY INSECTS

Insect	Host	No. of collections	Remarks
Archips cerasivorana (Fitch)	chokecherry	1	decrease from 1961
A. rosanus Linn.	chokecherry	2	decrease from 1961
Contarinia spp.	F	Plots	pocket infestations; generally light
Dioryctria auranticella (Grote)	Py cones	Plots	4 plots. Average 13 per cent infested
D. pseudotsugella Munroe	F	17	common
Griselda radicana Wlshm.	Se, F	13	decrease
Polygonia f. rusticus Edw.	false azalea	0	collapse of infestation near Blue River
Semiothisa granitata Gn.	F, Se, Ba	39	common. 82 larvae in one collection near Jamieson Creek
Zeiraphera fortunana Busck	Se	2	unchanged

STATUS OF FOREST DISEASES

Important Diseases

Melampsora Rust of Trembling Aspen

A survey to determine distribution of the uredinial state of Melampsora albertensis Arth. relation to climatic zones was conducted in the Central Kamloops District. Varying degrees of M. albertensis infections were encountered on trembling aspen foliage at the 20 localities sampled (Table 11). Only two localities were classified as heavy; these were near Mamette

Lake and Lac le Jeune. Heavy infection by Melampsora occidentalis Jacks. was found on 30 per cent of the black cottonwood samples. Locations of heavy infection were Deadman Creek and Adams Lake.

Table 11

Host and Attack intensity of Melampsora spp. on Poplars, Central Kamloops District, 1962

Host	Intensity of attack				Total
	Negative	Light	Medium	Heavy	
Aspen	8	3	6	3	20
Cottonwood	6	1	0	3	10
White poplar	6	0	0	0	6
Total	20	4	6	6	36

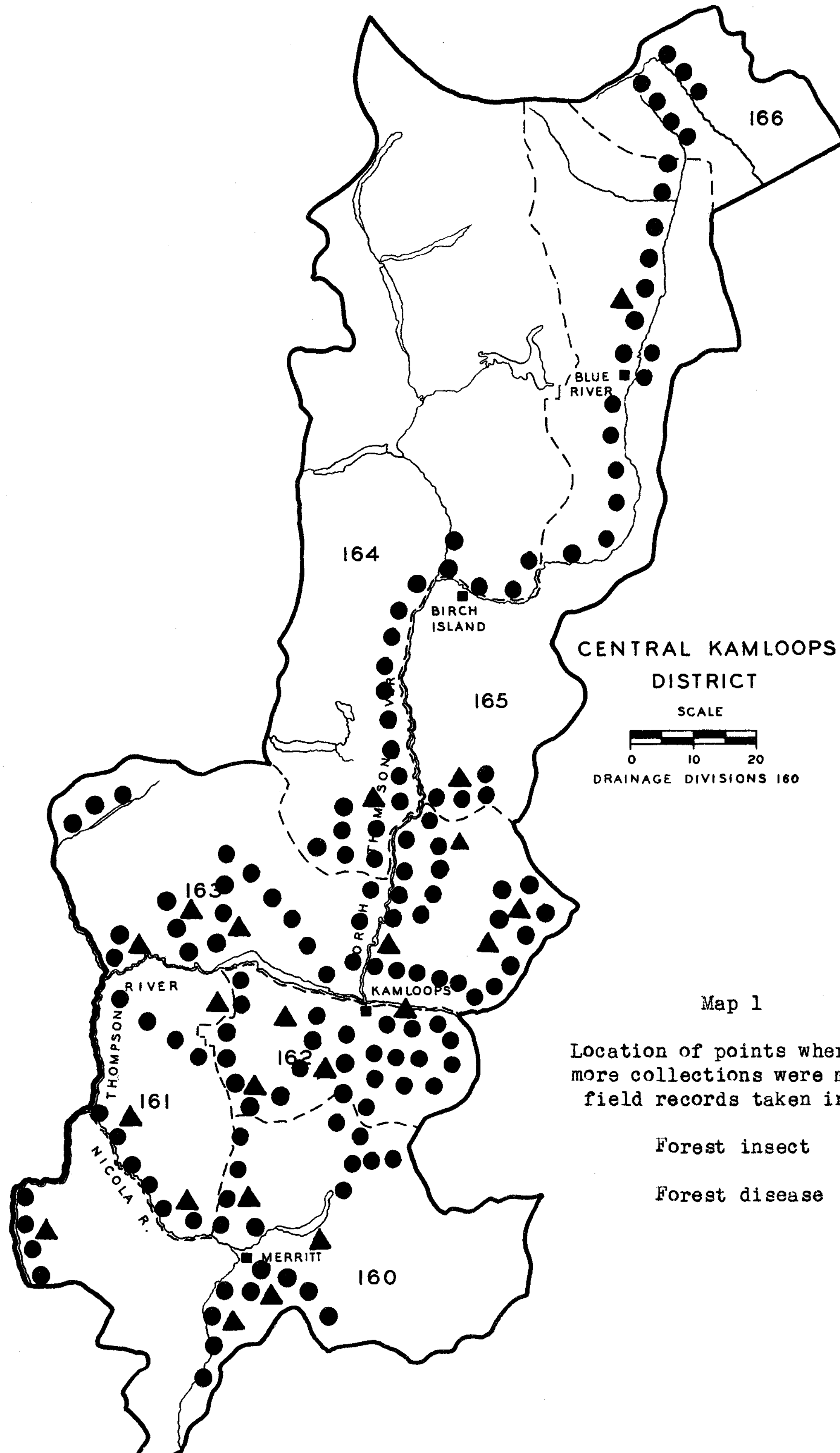
Needle Cast of Ponderosa Pine

Infections of a ponderosa pine needle cast caused by Elytroderma deformans (Weir) Darker, caused heavy browning in three areas of the District: Nicola, Lower Nicola and 10 miles north of Lac le Jeune. Two sample plots established in 1960 to record the progress and damage of the disease, are located in the latter two areas. Table 12 shows the number of ponderosa pine trees in each infection category in the two permanent sample plots.

Table 12

Needle Cast Damage on Ponderosa Pine in Two Plots, Central Kamloops District, 1960, 1961 and 1962

Est. percentage foliage infect.	No. of trees					
	Lower Nicola			Lac Le Jeune		
	1960	1961	1962	1960	1961	1962
0	0	0	0	1	0	3
10	1	0	4	7	1	9
20	2	2	4	7	5	6
30	2	1	0	6	5	0
40	6	2	1	11	5	1
50	5	8	6	6	8	8
60	4	6	2	7	11	1
70	4	4	4	4	9	6
80	5	5	3	4	9	4
90	1	1	5	8	4	14
100	3	4	4	10	14	19
Total	33	33	33	71	71	71



Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲

FOREST INSECT AND DISEASE SURVEY

WEST KAMLOOPS DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

WEST KAMLOOPS DISTRICT

1962

T. A. D. Woods

INTRODUCTION

The field season in the West Kamloops District commenced April 9 and continued until September 21. The season's work included a study of the Douglas-fir beetle, entailing field examinations of overwintering beetle broods, foliage colour change plots and an appraisal of Douglas-fir trees killed in the three year period 1959 to 1961.

A total of 465 insect and 21 forest disease collections were taken at random and from permanent sample points between May 9 and September 21, 1962. Table 1 shows the collections by hosts and Map 1 shows the location where one or more collections and field records were obtained in 1962.

Table 1

Collections by Hosts, West Kamloops District, 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	4	-	Alder spp.	17	-
Douglas-fir	150	2	Aspen, trembling	30	9
Fir, alpine	14	1	Birch spp.	21	1
Hemlock, western	2	-	Cherry, choke	2	1
Juniper, common	7	-	Cottonwood, black	5	2
Juniper, Rocky Mtn.	10	-	Poplar, white	1	-
Pine, lodgepole	65	2	Willow spp.	16	-
Pine, ponderosa	40	2	Miscellaneous	13	-
Spruce, Engelmann	72	1			
			Total	105	13
Total	364	8	Grand total	469	21

STATUS OF INSECTS

Douglas-fir Beetle, <u>Dendroctonus pseudotsugae</u> Hopk.

The Douglas-fir beetle survey for 1962 included four major fields of study.

The aerial survey of the District, usually conducted in the fall, was completed in July. Accelerated colour change in 1961 made it imperative that the flights be carried out before needle loss reached a point at which many trees would be missed. Aerial observations in 1962 included parts of the District that were not surveyed in 1961. This, combined with the heavy 1961 attack, has resulted in a 26 per cent increase, from 1960 to 1961, in the number of trees known to have been killed by bark-beetles in the Cariboo.

The six 48-acre strip plots near Lac la Hache were examined by Forest Entomology personnel in August.

Brood mortality studies were conducted at Williams Lake, Lac la Hache and 100 Mile House during mid-April, 1962.

Foliage colour change studies in the West Kamloops District continued and new plots containing 1962 attacked trees were established at 134 Mile and Lac la Hache. The method of inducing an attack through the use of caged adults was tried at Williams Lake, Lac la Hache and Clinton.

Tree damage appraisal survey

Most of the 1962 flying time was used in the eastern portion of the District, which had not been surveyed adequately in 1961 because of the dense smoke haze that seriously reduced visibility. Figures for most of the Meldrum Creek and Seton-Anderson lakes areas are not included in the 1962 total of 19,132 red-topped trees counted in the District.

Table 2 shows the total number of trees counted each year and volume of timber destroyed for seven consecutive three year periods. These periods are based on the assumption that Douglas-fir trees drop all of their needles within three years of attack. The volume killed was based on figures derived from measurements of beetle-killed trees taken at representative localities in the District over the past three years. As more measurements are taken more complete knowledge of losses will be available. Volumes of infested trees ranged from averages of 51 to 104 cubic feet per tree in the ten localities for which data were obtained.

The two areas with the highest concentrations of red-tops are both west of Williams Lake (Map 2). The plateau northwest of Williams Lake had 800 1961 attacked trees. The other area borders on the Chilcotin River where over 1,700 trees were counted.

Table 2

Number and Volume of Douglas-fir Trees Killed by Douglas-fir Beetles by Three-year Periods as Determined in 1956 to 1962 Inclusive, West Kamloops District

Period	Year of survey	No. of trees killed	Volume (cu. ft.)
1953-1955	1956	8,800	602,800
1954-1956	1957	5,990	410,300
1955-1957	1958	11,980	820,600
1956-1958	1959	15,590	1,067,900
1957-1959	1960	28,970	1,968,200
1958-1960	1961	14,062	952,073
1959-1961	1962	19,132	1,445,426

Strip plots

The six Douglas-fir strip plots in the Lac la Hache area were cruised August 14 to 16, 1962. These plots have been examined annually since 1959 for currently infested trees, to obtain information on population fluctuations and colour change. Stand depletion on the strips due to bark beetle attacks over four consecutive years is as follows:

	1959	1960	1961	1962
No. acres cruised	288	288	288	288
No. trees killed per acre	0.09	0.01	0.15	0.17

The 1962 cruise showed that four of the 1961 attacked trees had recovered, reducing the number of trees killed per acre for that year from 0.16 to 0.15. Forty-nine currently infested trees were tagged in 1962. The 1962 attack was classified as light to medium with no currently attacked trees found on the south pipeline or reserve plots.

Winter mortality of beetle broods

This study has been conducted annually since 1956 but only in the last three years have the sample points been the same each year. They have relatively little relationship to the sample points used in the previous four year period 1956-1959; therefore only data for 1960-1962 are shown in Table 3.

Sampling procedures were as follows: four trees at three points were felled and bark samples taken at 10 foot intervals from the stump up the bole until no more attacks were found. The samples were six by 24 inches, one from each cardinal direction. The percentage mortality of teneral adults is shown in Table 3.

Table 3

Percentage Mortality of Overwintering Douglas-fir Beetle Broods, West Kamloops, 1960 - 1962

Location	1960	1961	1962
100 Mile House	40.3	34.7	20.7
Lac la Hache	27.2	11.8	13.0
Williams Lake	31.6	9.2	11.0
Average	33.5	13.2	15.3

Foliage colour change

Results of colour change studies of 1961 attacked trees are shown in Table 4. The trees turning red in the fall of 1961 did not lose any more needles than those which turned colour in the spring of 1962. Most of the early needle loss occurs when the trees fade or turn red. The trees at Lac la Hache lost an average of one per cent of their needles while still green.

Table 4

Colour Change Studies of 1961 Attacked Trees, West Kamloops Distirct, 1962

CLINTON	No. of trees			Percentage needle loss
	green	fading	red	
May	3	1	5	44
June	0	3	6	48
August	0	0	9	68
September	0	0	9	69
LAC LA HACHE				
May	5	0	0	1
June	1	3	1	3
August	0	1	4	45
September	0	0	5	65
SODA CREEK				
May	0	0	5	57
June	0	0	5	60
August	0	0	5	62
September	0	0	5	64

Colour change in 1962, of trees attacked in 1961, located on three of the six strip plots is shown in Table 5.

Table 5

Colour Change Studies of 1961 Attacked Trees on Three Strip Plots near Lac la Hache, West Kamloops, 1962

Station	Date of examinations	No. of trees green	No. of trees fading	No. of trees red	Percentage needle loss
2	Aug. 14, 1961	16	0	0	0
	Aug. 14, 1962	0	0	13	64
5	Aug. 16, 1961	7	0	0	0
	Aug. 15, 1962	0	0	7	72
13	Aug. 17, 1961	3	0	0	0
	Aug. 14, 1962	0	1	2	58

Two colour change plots containing trees attacked in 1962 were established. Thirty-four trees at Mile 134, Cariboo Highway and 10 at Lac la Hache were marked for study. No colour change was noted in September.

The work carried out in 1962 on the induced attack project met with limited success. Twenty virgin females were caged on each of five trees in three groups. All trees at Soda Creek and three at Lac la Hache sustained a medium to light attack. None of these trees is expected to die. At Clinton the beetles were caged on May 11 during a week of cool wet weather. Many died of exposure and the few that did enter the trees were "pitched out". One of the five trees sustained a medium attack.

Ten trees at Lac la Hache were used in the induced attack project in 1961. Colour change of the two trees successfully attacked about May 25, 1961 was as follows: October 3, 1961, one tree red with 15 per cent needle drop; May 25, 1962, one tree fading, the other red with 50 per cent needle loss; September 19, 1962, both trees red with 85 per cent needle drop. Three of the trees on this plot were attacked in 1962. One was located June 27, 1962 and the other two were noted on August 24, 1962. One of the latter had "pitched out" a 1961 attack. All trees were green and no needle loss was noted in September.

Mountain Pine Beetle, *Dendroctonus monticolae* Hopk.

Increased activity of the mountain pine beetle in the West Kamloops District was indicated by the number of new infestations found in 1962.

Ponderosa Pine

The infestation at Fly Creek totalled 28 green-infested ponderosa pine ranging from 13 to 30 inches d.b.h; 10 were marked for colour change study. At another point 41 pole-sized pine had been killed over the past three years. No freshly attacked trees were found in this group. The largest number of dead pine was discovered at Carpenter Lake and above Bridge River to Goldbridge. One hundred and four trees were killed in the last three years. Groups of 10 and 20 pine respectively were killed at Izman Creek and Murray Creek.

On September 14, 1962 a strip, 80 chains by one chain, was run through a stand of ponderosa pine northwest of Carquile. Many of the trees had been damaged by the needle cast fungus Elytroderma deformans (Weir) Darker. It was believed that the disease had weakened many of the trees and made them more susceptible to attack by bark beetle. However, no definite relationship between the trees damaged by the needle cast disease and trees killed by bark beetle could be established. The red-topped trees were killed by a combination of D. monticolae and D. brevicomis Lec. All the green-infested trees had been attacked by the mountain pine beetle. Trees from six to 22 inches d.b.h. were killed. The following gives the percentage stems killed and average diameters:

	Old grey	Red-topped	Green-infested	Healthy
Total	55	20	10	99
Percentage of stems	30.0	10.8	5.4	53.8
Average d.b.h.	12	13	12	13

Lodgepole pine

On August 28, 1962 a strip, 50 chains by one chain, was run through a stand of timber on the northwest slope above Cariboo Lake. A large number of dead trees were present. The strip ran up the slope to 3800 feet through a mixed stand of lodgepole pine, Douglas-fir, Engelmann spruce, alpine fir and a few western red cedar and western hemlock. Although eight red-topped and five green-infested lodgepole pine were recorded, the major part of the tree mortality had occurred about 10 years ago. The five and one-half mile area is bordered by Keithley Creek in the west and Nigger Creek in the east and extends from close to the Lake to about a mile up the slope.

The condition of all lodgepole pine tallied is shown below.

	Old Grey	Red-topped	Green-infested	Healthy
Total	367	8	5	189
Percentage of stems	64.9	1.4	0.1	33.6
Average d.b.h.	14	12	10	10

Lodgepole pine had been attacked and killed at three other areas in the District. Three green-infested and 14 red-topped trees averaging nine inches d.b.h. were found at Fly Creek.

Ten 1961 and five currently infested trees were located at Kwotlenemo Lake in Fountain Valley. Ten trees attacked in 1961 and seven in 1962 were found two miles south of the Lake.

Spruce Budworm, _Choristoneura fumiferana_ (Clem.)

Eight permanent sample plots, established in the Lillooet area in 1960 to follow the trend of spruce budworm populations, were examined in August. Beating samples of Douglas-fir were taken at all but one of the plots. No larvae or feeding damage were recorded. One larva was collected at Mile 15.5 on the Texas Creek road. The following table compares the data obtained from three tree beating samples taken from Douglas-fir throughout the District in 1961 and 1962.

Year	No. collections taken during larval period	Percentage containing larvae	Av. no. larvae per positive sample
1961	27	22	1.0
1962	50	12	1.7

Other tree species from which larvae were collected during the larval period, June and July, were Engelmann spruce, lodgepole pine and alpine fir.

Douglas-fir Tussock Moth, _Orgyia pseudotsugata_ (McD.)

Areas suspected of having high populations of the Douglas-fir tussock moth were examined twice in 1962. The first examinations were conducted in May, when branches from the mid-crown of two trees were checked for old cocoons and egg masses. The second examination took place during the latter part of the larval season.

Douglas-fir at Carquile and Oregon Jack Creek had suffered heavy defoliation and top kill from past outbreaks, but no trace of the tussock moth was found at either locality in 1962. No cocoons or larvae were found in 1962 at Fountain Valley where, in 1948-1949, large numbers of larvae had been collected. No tussock moth were collected in June at Texas Creek where a light population was found in 1961, but five larvae were taken in two beating samples in August.

Larvae were collected but no defoliation was noted at two new areas in 1962, Murray Creek southwest of Spences Bridge and McLean Lake road northwest of Cache Creek. Two and four larvae respectively were collected from these points in 1962.

The Oregon Fir Sawyer, _Monochamus oregonensis_ Lec.

A timber sale located 12 miles northwest of Cache Creek was examined on June 15, 1962, at the request of the B. C. Forest Service. Over 800 tree-length logs had been in the woods since the spring of 1960. During that summer they had been heavily infested by the Douglas-fir beetle and some logs had also been attacked by sawyer beetles. These logs were unmerchantable as a result of the sawyer beetles' attack.

Apparently some sawyer beetles had emerged in 1961 and there was further emergence in 1962. The elevation at the sample point was 3,800 feet. Two males and two females were recovered from logs in the process of chewing out their exit holes.

One square foot of bark was removed from five randomly selected logs, and the total number of entrance and exit holes were counted. An average of one entrance and one exit hole per square foot of log surface was recorded.

No borers were found in the nearby ponderosa pine logs.

Black-headed Budworm, Acleris variana (Fern.)

Black-headed budworm larvae were taken in four collections from two tree species; Douglas-fir at Pavilion Mountain, Murray Creek, and Mile 98 on the Cariboo Highway, and from Engelmann spruce at Pigeon Creek. In 1960 and 1961 one and three collections respectively contained this budworm.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Four beating samples taken from Douglas-fir in the southern portion of the District contained larvae of the western hemlock looper. The population remained at a low level.

False Hemlock Looper, Nepytia canosaria Wlk.?

All false hemlock looper larvae over the past two seasons have been collected from Douglas-fir. The following table shows results of three-tree beating samples taken in the southern portion of the West Kamloops District during the larval season, June and July.

Year	No. collections taken during larval period	Percentage containing larvae	Av. no. larvae per sample
1961	26	23.0	3.2
1962	60	16.6	1.9

Saddle-backed Looper, Ectropis crepuscularia Schiff.

The population of this species remained at a low level in the District in 1962. Single larvae were collected from Douglas-fir and hemlock.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

An average decrease of 50 per cent was recorded in the aspen leafminer population at four permanent sample points in West Kamloops District in 1962. Table 6 compares the number of leaves containing mines and number of adults produced per leaf surface for 1959 through 1962. The leaves of two branches from each of five trees per plot were examined to gain this information.

Table 6

Aspen Leaf Surfaces Mined and Number of Adults Produced per Leaf Surface, West Kamloops, 1959 - 1962

Location	Percentage leaf surfaces with mines				No. adults produced per leaf surface			
	1959	1960	1961	1962	1959	1960	1961	1962
Cache Creek	21	21	37	21	0.01	0.06	0.05	0.03
Clinton	24	17	13	4	0.02	0.01	0.01	0.
Williams Lake	16	16	89	46	0.03	0.02	0.16	0.04
Soda Creek	28	68	83	36	0.03	0.21	0.05	0.04

The percentage mortality from parasites and other causes for the years 1959-1962 is shown in Table 7. Parasitism remained at a high level or increased at all plots except Cache Creek.

Table 7

Mortality of Aspen Leaf Miners in 100-cocoon Samples, West Kamloops, 1959-1962

Location	Percentage mortality in cocoon stage							
	Parasites				Other causes			
	1959	1960	1961	1962	1959	1960	1961	1962
Cache Creek	19	22	40	20	65	47	13	20
Clinton	14	16	47	55	64	38	19	17
Williams Lake	0	19	29	47	69	51	9	22
Soda Creek	4	39	54	53	68	34	14	20

Fourteen other localities were checked by taking 50 leaves from each of three trees and calculating the percentage infested. The average infestation in the Chilcotin was 17 per cent. East of 100 Mile House and near Clinton the average percentage infested was 77 and 25 respectively. West of Lillooet at Tyaughton Lake, 96 per cent of the leaves of three trees were mined.

On May 18, 1962, larval mines at Lytton (elevation 600 feet) were over 10 mm. long, while in Fountain Valley (elevation 2200 feet) the eggs had not yet hatched.

Jack Pine Needle Miner, Zelleria haimbachi Busck

No jack pine needle miner larvae were collected in random samples from ponderosa pine in 1962. The population in 1962 decreased compared with 1961 (Table 8). Data were gathered by examination of 25 pine tips on each of four trees at six permanent sample stations.

Table 8

Percentage Ponderosa Pine Tips Infested by the Jack Pine Needle Miner, West Kamloops, 1961-1962

Location	Percentage tips infested	
	1961	1962
Lillooet	-	2
Mile 3 Botanie Creek Road	0	2
5 miles northwest Botanie Lake	1	0
9 miles west of Lytton	5	0
Venables Valley	1	0
Mile 2 Lower Hat Creek Road	1	0
Average	1.6	0.7

Satin Moth, Stilpnotia salicis Linn.

A small population remained active at Maiden Creek, where for the last two seasons, larvae caused light defoliation of white poplar and black cottonwood.

A single larva was collected in a standard beating sample from trembling aspen at Pavilion Mountain west of Clinton.

Spotless Fall Webworm, Hyphantria cunea (Drury)

There was a decline in the fall webworm population in the Lillooet area. Some tents were noted on two choke cherry bushes south of Pavilion.

Table 9 shows the number of webs per mile on various hosts in the Fraser Valley portion of the West Kamloops District during August. During the survey only one side of the road was examined for tents. In 1961, 50 webs were counted, compared with only 21 in 1962.

Table 9

Spotless Fall Webworm Tent Counts, West Kamloops District, August 7, 1962

Host	No. webs per mile							Average
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	
Texas Creek								
Alder	-	-	0	0	0	0	1	0.2
Birch	-	-	0	0	0	0	0	0
Black cottonwood	-	-	0	0	0	0	0	0
Domestic apple	-	-	0	0	1	4	0	0.8
Saskatoon	-	-	0	0	1	0	0	0.2
Totals			0	0	2	4	1	1.2
Lillooet								
Black cottonwood	0	4	0	0	0	-	-	0.8
Choke cherry	0	6	0	0	0	-	-	1.2
Saskatoon	2	2	0	0	0	-	-	0.8
Totals	2	12	0	0	0	-	-	2.8

Laspeyresia sp. in Ponderosa Pine Cones

A light to medium cone crop was noted throughout the range of ponderosa pine in 1962.

Fifty ponderosa pine cones were examined at the following five localities and the percentage infested by a cone moth were as follows:

	Venables Valley	Lytton	Lower Hat Creek	Clinton	Pavilion Lake
Percentage cones infested	66	64	64	0	0

A Cone Pyralid, Dioryctria abietivorella D.-S.

The Douglas-fir cone crop was moderate to heavy in 1962. Fifty cones at each of five localities were examined for damage caused by Dioryctria abietivorella D.S., and the percentage infested was as follows: Venables Valley 100, Lytton 82, Texas Creek 90, Clinton 30 and Pavilion Lake 20.

A Snout Beetle, Magdalis lecontei Horn

This snout beetle had destroyed most new foliage of approximately 25 reproduction and immature pole-sized ponderosa pine at Murray Creek on August 1, 1962, (Figure 1). It was assumed the adults came from the previous year's logging slash.

The weevils fed by chewing a hole in the sheath and feeding on portions of the enclosed needles (Figure 2). This resulted in the damaged needles' becoming discoloured and drooping above the feeding site which gave the infested trees a wilted appearance (Figure 3).

Murray Creek is one of two areas where this damage was first observed in British Columbia.

The Lodgepole Terminal Weevil, Pissodes terminalis Hopk.?

The Alexis Creek Ranger District was the only area where the terminal boring weevil was found in 1962. Infested lodgepole pine leaders were collected 4.5 miles east of the Tatla Lake Junction and one-half mile north of the Dean River Bridge. The damaged trees ranged in height from five to seven feet. Infestation was light in the two stands of pure lodgepole pine reproduction.

Douglas-fir Needle Midges, Contarinia spp.

Light to medium infestations of Contarinia spp. on Douglas-fir occurred throughout the West Kamloops District in 1962. These observations were verified by visual estimates of the number of infested needles on each of three fir trees at 15 sample points (Table 10).

Table 10

Intensity of Douglas-fir Needle Midge Damage in the West Kamloops District, 1962

Location	*C. pseudotsugae*	*C. constricta*	*C. cuniculator*
Cariboo Lake	medium	-	-
Whiskey Creek	light	-	light
Williams Lake	light	-	-
Spring House	light	light	-
Pablo Creek	light	-	-
Borland Creek	light	-	-
139 Mile	light	-	light
134 Mile	light	light	-
Lac la Hache	light	medium	-
102.5 Mile	medium	light	-
80 Mile	-	-	-
Lillooet	medium	-	-
Applespring Creek	medium	medium	-
Bralorne	-	light	-

An Alder Flea Beetle, *Altica* sp.

Severe skeletonization of alder leaves by both adults and larvae of the alder flea beetle was noted at five locations in the District. At Miles 4 and 7 on the Texas Creek Road five bushes at each point had 50-90 per cent of their leaves destroyed. Alder bushes at Applespring Creek, Yalakom River and Izman Creek had 67 per cent of their leaves severely skeletonized.

A Spruce Gall Midge, *Rhabdophaga swainei* Felt?

Galls caused by this midge were collected from Engelmann spruce near Robert Lake and west of Anahim Lake.

Spruce Gall Aphid, *Adelges cooleyi* (Gill.)

No survey of gall aphid damage on Engelmann spruce was conducted in 1962. Damage was generally light throughout the District.

A Sawfly, *Xyela* sp.

The percentage of ponderosa pine flowers damaged by *Xyela* sp. remained about constant (Table 11). Two sample stations, Lillooet and Clinton, were added in 1962 to give better coverage within the range of ponderosa pine. Sampling procedure involves the checking of three staminate flower clusters from each cardinal direction on three trees per locality. The flower crop was poor but damage was slightly higher in 1962.

Table 11

Percentage Ponderosa Pine Flowers Infested
by *Xyela* sp., West Kamloops District

Locality	Percentage flower damaged	
	1961	1962
Venables Valley	11	5
Lytton	25	38
Lillooet	-	41
Clinton	-	0

The Poplar Borer, *Saperda calcarata* Say

Five moderately attacked aspens were found on the south shore of Williams Lake. No other damage was observed in 1962.

Borers in Black Cottonwood, *Saperda* sp.

No new infestations were found in 1962. No adults were collected from the Cache Creek infestation in 1962.

A Leaf Roller on Birch, *Allononyma vicarialis* Zell.

Five to 15 per cent of the leaves of water birch at Carquile, Oregon Jack Creek and Lower Hat Creek were skeletonized by these leaf rollers.

Poplar Leaf Beetles, *Pachybrachys* spp.

The Lombardy poplar and black cottonwood that were lightly infested by leaf beetles in the last two years were removed in 1962. No larvae or adults of *Pachybrachys* spp. were collected elsewhere in the District in in 1962.

A Leaf Beetle, *Gonioctena americana* Schffr.

Adults of this species had lightly defoliated a small clump of aspens at Black Creek southeast of Horsefly.

Mourning Cloak Butterfly, *Nymphalis antiopa* (Linn.)

Light defoliation of willow bushes occurred in the Horsefly, Williams

Lake, 100 Mile House and Lillooet Ranger districts in 1962. Larvae were collected at Texas Creek and Horsefly.

MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
Caripeta aequaliaria Grt.	Py, Pl	4	increase
C. angustiorata Wlk.	Pl	11	increase
C. divisata Wlk.	H, Pl, F	24	increase
Chionodes retiniella B. & B.	Py	2	needle miner; scarce
Dioryctria pseudotsugella Munroe	F	3	increase
Eucordylea atrupictella Dietz	F, Pl,	7	22 larvae in sample from lodgepole pine
Glena nigricaria B. & McD.	Py, F	21	increase
Griselda radicana Wlshm.	Se, F	6	increase
Melanolophia imitata Wlk.	C, Ba, Py, F	13	increase
Neodiprion spp.	F	20	decrease
Neodiprion spp.	Pl	14	decrease
Neodiprion spp.	Py	8	not collected in 1961
Neodiprion spp.	Se	24	increase
Pikonema alaskensis Roh.	Se	18	no change
Semiothisa granitata complex	Ba, Pl, F H, Se	74	increase
Zeiraphera pseudotsugana Kft.	F	1	decrease

STATUS OF FOREST DISEASES

Important Diseases

A Needle Cast of Ponderosa and Lodgepole Pines

There was a very slight decrease in infection in 1962 in the two plots established in 1960 at Lower Hat Creek and Clinton to study the trend of needle cast of ponderosa pine caused by Elytroderma deformans (Weir) Darker.

Lodgepole pines lightly infected by this disease were observed in the following areas: east of 100 Mile House, west of Alexis Creek, east of Dog Creek, and north of Clinton.

A Foliage Disease of Aspen

During the latter part of August clumps of aspens with shriveled brown leaves, caused by Marssonina brunnea (Ellis & Everh.) Sacc., were observed along the Cariboo Highway from Clinton to Macalister. This condition was also evident at Keithley Creek, Likely and along the shores of Horsefly and Quesnel lakes. The trees appeared to have been almost stripped of foliage and the leaves were shriveled to a quarter of their original size.

Melampsora rust of Trembling Aspen

The following report gives the results of the 1962 survey of Melampsora albertensis Arth. (see foreword)

On May 28, samples of 100 overwintered leaves were collected from aspen stands at three localities. The leaves bearing the largest amount of the telial stage of the rust were collected 40 miles south of Williams Lake. The other two collection points, one mile south of 100 Mile House and 40 miles south of 100 Mile House, had very few telia per leaf.

The next phase of the survey involved recording the occurrence of the aecial stage of the rust on Douglas-fir and pine. No aecial stage was found at the following localities: south of Williams Lake 20 and 40 miles; south of 100 Mile House one, 20 and 40 miles. These points were examined on June 4 and 28 and July 6. The examinations included Scots pine and red pine on the exotic plantations north of Clinton.

Twenty-one points in the District were examined for the uredinia stage of the rust on trembling aspen, and the following information was recorded. Points where 30 or more uredia per leaf were counted were as follows: Pablo Creek, Lillooet south, and Lytton north. All collections were determined to be M. albertensis Arth. Sample points which had from five to 30 uredinia per leaf, giving them a moderate infection rating, were Mile 136, Mile 102.5, Mile 80 Cariboo Highway, Oregon Jack Creek, and south of Clinton. The other 13 points were rated as light. Very few leaves were infected and those that were had five or less uredinia per leaf.

EXOTIC PLANTATIONS

Thirty Scots pine on XP 183 at Knife Creek were examined in May. Eighteen were in good condition. Six were dead and the remaining six trees were in poor condition.

Death in all cases was caused either by adverse weather conditions or rodents and larger animals.

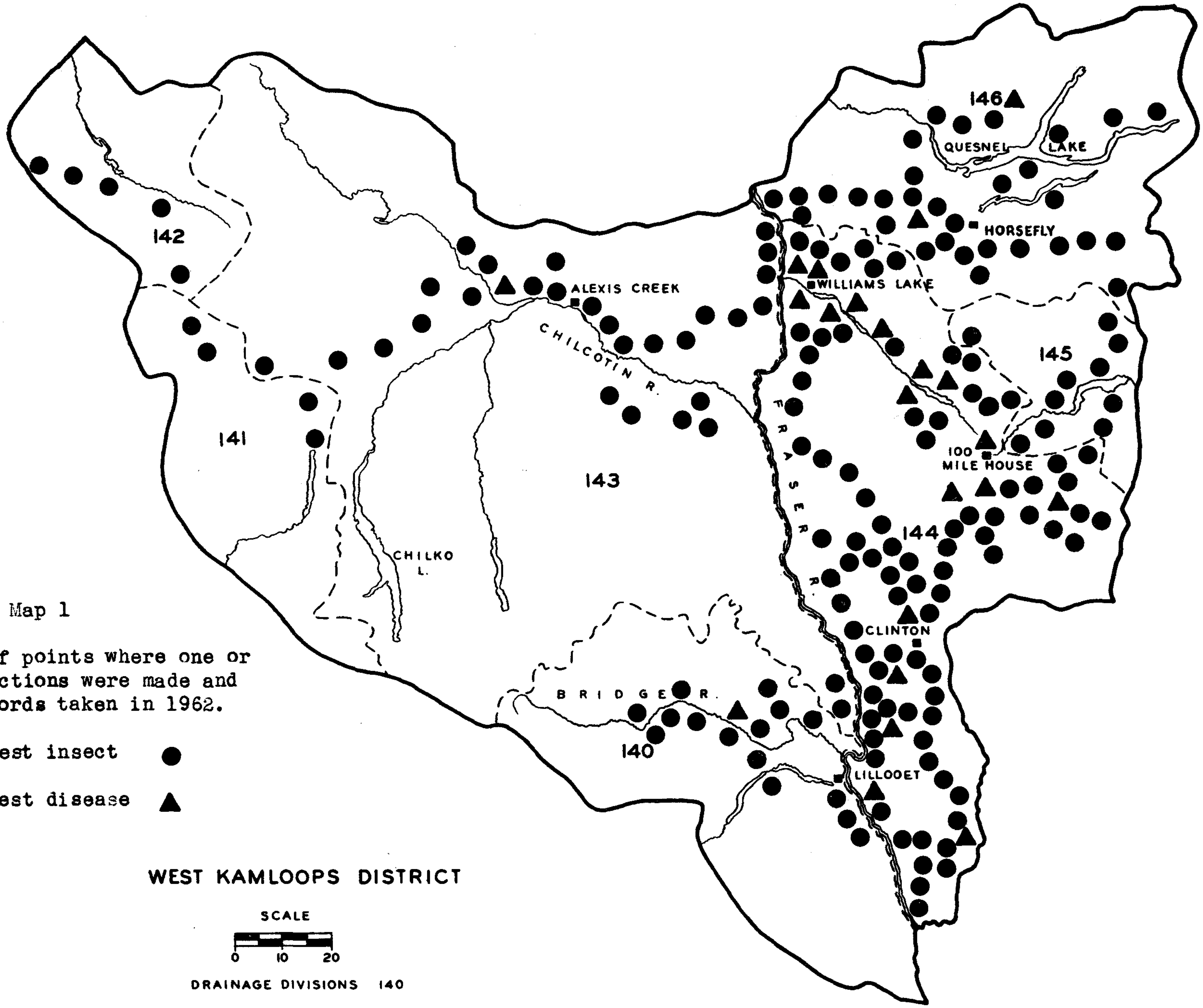
The two remaining plots located north of Clinton were examined in May and again in June. The survival rate in 1962 for XP 113 and XP 114 was 10 and nine per cent respectively.

Condition of trees on Exotic Plantations Clinton, 1959-1962, were as follows:

Plot no.	Tree species	No. seedlings planted 1957	No. seedlings surviving				Percentage killed by drought			
			'59	'60	'61	'62	'59	'60	'61	'62
XP 113	Scots pine	95	31	26	18	9	67	73	81	90
XP 114	Red pine	95	22	17	10	8	76	82	89	91

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Cherry, choke	Dibotryon morbosum (Schw.) Theiss. & Syd.	Beaver Creek	canker disease
Fir, alpine	Pucciniastrum epilobii Otth.	Keithley Creek	needle rust
Pine, lodgepole	Peridermium harknessii J. P. Moore	Spout Lake	gall rust
	Peridermium stalactiforme Arth. & Kern	Spout Lake	stem rust



Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

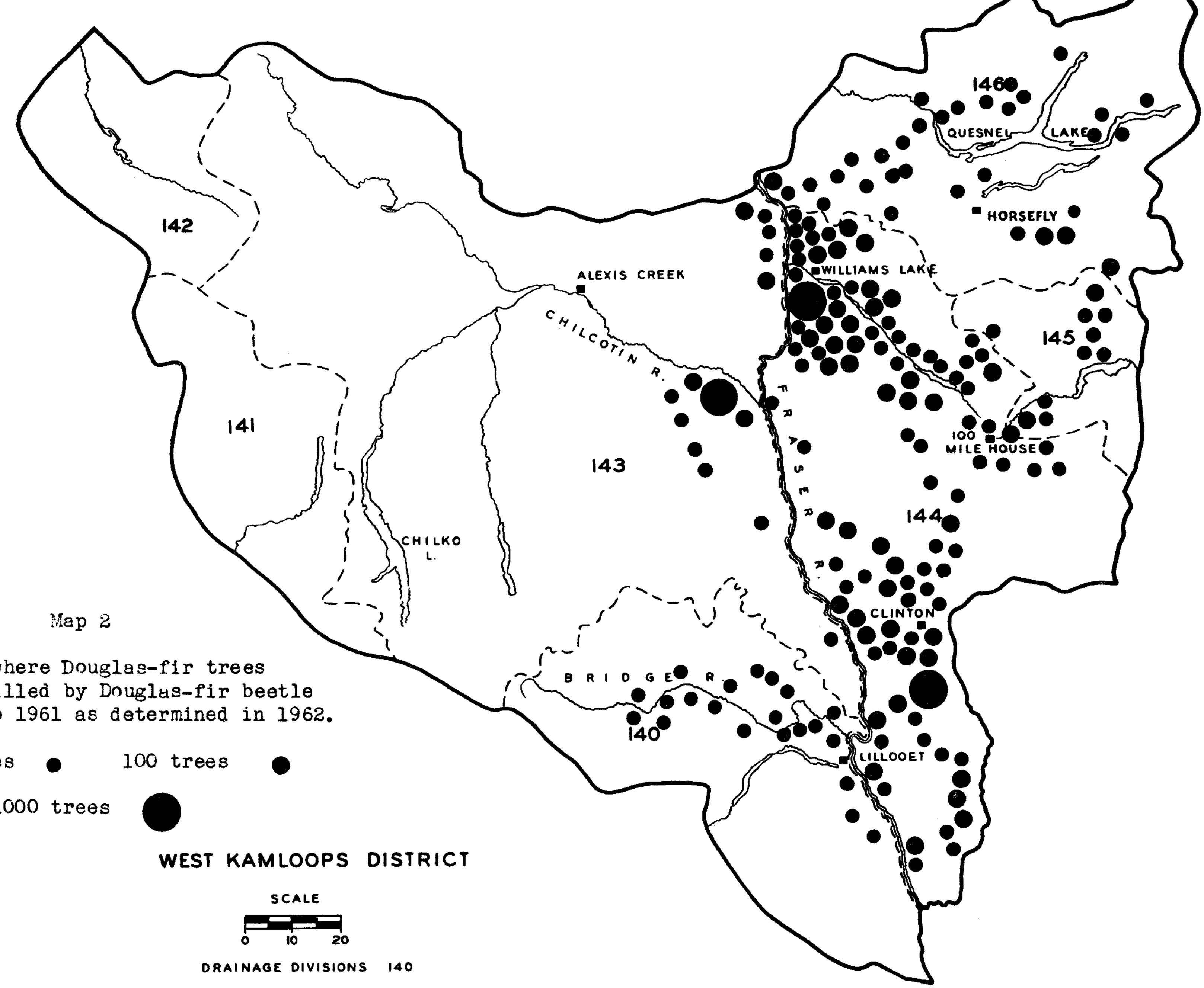
Forest disease ▲

WEST KAMLOOPS DISTRICT

SCALE

0 10 20

DRAINAGE DIVISIONS 140



Map 2

Points where Douglas-fir trees have been killed by Douglas-fir beetle from 1959 to 1961 as determined in 1962.

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

NELSON FOREST DISTRICT

FOREST INSECT AND DISEASE SURVEY

Nelson Forest District

D. W. Taylor

INTRODUCTION

Personnel assigned to the Central and West Nelson Ranger Districts, R. C. Wood and D. W. Taylor, remained unchanged. The East Nelson district was surveyed by N. Geistlinger who was reassigned from Insectary to field duties.

The primary economic pest was again the mountain pine beetle. The annual tree mortality counts totalled 12,000 red-topped white pine trees in East and Central Nelson districts and 5,200 red-topped lodgepole pines in the East and West Nelson districts. The heaviest damage in any single area was near Split Creek, in the main Kettle River Valley, where 4,000 lodgepole pine trees were killed.

Douglas-fir beetle activity decreased throughout the Nelson Forest district.

Trees attacked by the Engelmann spruce beetle were observed near Shelter Bay, Upper Arrow Lake, and in stumps only at Coal Creek east of Fernie.

Defoliator populations, with one exception, remained below the destructive level for the third successive year. The forest tent caterpillar infestation on aspen and alder hosts expanded to 55 square miles, from Warfield to Brilliant, and retained its original boundaries from Brisco to Donald Station and near Invermere. Severe defoliation is expected in 1963 at three smaller areas, Summit Lake, Slocan Park, and Kicking Horse River.

Further work was carried out on the relationship of *Melampsora albertensis* Arth., on poplar hosts, to the Telkwa pine rust. The uredinial stage proved common in the Nelson Forest District as ascertained by 70 samples made throughout the Forest District. No severe tree disease conditions were reported within the three Districts.

FOREST INSECT AND DISEASE SURVEY

WEST NELSON DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

WEST NELSON DISTRICT

1962

D. W. Taylor

INTRODUCTION

The 1962 survey of the West Nelson District took place between May 30 and October 2. During this period 382 insect and 52 tree disease collections were made, 87 of the former at permanent sample points. The total for tree disease collections includes 24 special collections related to Melampsora rust studies. Thirty-three permanent sample points are now established. Table 1 lists insect and tree disease collections by hosts. Map 1 gives the locations where one or more collections or field records were made.

Table 1

Collections by Hosts

West Nelson District, 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	19	-	Alder, mountain	11	-
Douglas-fir	81	3	Alder, Sitka	3	1
Fir, alpine	16	4	Aspen, trembling	10	27
Fir, grand	7	-	Birch, western white	3	1
Hemlock, western	44	2	Cottonwood, black	7	1
Juniper, common	2	-	Elder, blueberry	4	-
Larch, western	31	7	Maple, Douglas	2	-
Pine, lodgepole	38	-	Willow spp.	6	-
Pine, western white	20	-	Miscellaneous	14	3
Pine, ponderosa	27	2			
Spruce, Engelmann	35	1	Total	60	33
Yew, western	2				
Total	322	19	Grand total	382	52

STATUS OF INSECTS

Douglas-fir Beetle, <u>Dendroctonus pseudotsugae</u> Hopk.

Douglas-fir beetle damage was light in the District in 1962. Seventy red-topped trees were tallied in areas previously attacked. No continuation of infestations was observed at State Creek or Beaverdell, and only occasional "red-tops" were evident near Edgewood at Taite Creek, Pin Creek and Worthington Creek.

A trap tree program carried out by Boundary Sawmills Ltd., in the Windfall Creek Valley in the fall of 1961, produced excellent results. No infested Douglas-fir trees were found in that watershed in 1962, although 11 trees attacked in 1961 were counted in the adjoining Fiva Creek watershed.

Mountain Pine Beetle, <u>Dendroctonus monticolae</u> Hopk.

The mountain pine beetle was the most destructive pest in the District, killing approximately 4,000 lodgepole pine trees in the main Kettle River Valley and 170 white pine trees in the Whatshan Lake area.

The infestation area in the main Kettle River Valley extended from Stove Creek, approximately 12 miles south to the Split Creek junction, in Region 24, Compartments 12 and 14, and covered an area of 3,968 acres. From measurements in the infested area a volume of 35.5 cubic feet per tree is used in all calculations.

Two methods of aerial survey were used; the first was based on estimates by two observers. The total count for both sides of the river was 4,000 red trees or 1.01 per acre. This is a loss of 142,000 cubic feet or 35.7 cubic feet per acre.

The second method used was the limited-strip-viewer. A speed of 60 m.p.h., at 2,000 feet above the river, for two minutes' flying time gave a theoretical 160 acres for each of two strips. The strips viewed were calculated to be on a 40 per cent slope requiring a 27 per cent reduction in width to convert to "flat viewing". This gave a viewed strip of 116 acres.

There were 153 red-tops counted within the limits of the north strip and 132 in the south strip, or an average of 1.22 trees per acre for the entire 232 acres viewed. Using 35.5 cubic feet as a volume basis per tree, the tree mortality on the two strips was calculated to be 43.3 cubic feet per acre.

A summary of the two systems is as follows: the total area viewed by the two observers was 3,968 acres with tree mortality at 35.7 cubic feet per acre and a total of 141,657 cubic feet. The second system showed tree mortality to be 43.3 cubic feet per acre for a total volume loss of 171,814 cubic feet for the entire infestation. This is a difference of 30,157 cubic feet, or 7.6 cubic feet per acre more than the estimating method in the first system. Map 2 shows the mortality of lodgepole pine killed by the mountain pine beetle in 1960 and 1961.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Extent of defoliation increased from the original Trail-Warfield area north along the Columbia River Valley into the Pass Creek Valley, north along the Kootenay River banks to Glade, at Procter, and in the Crawford Bay area. The total area was nearly 55 square miles, and defoliation was uniformly heavy. Defoliation also occurred at Waneta, Christina Lake, Brown's Creek and Motherlode Creek. Although the favoured host was aspen, defoliation ranging from trace to 90 per cent was noted on western white birch, alder, red-osier dogwood, cottonwood, Lombardy and Carolina poplars, black locust and elderberry. Some eggs had hatched by May 8 in the Trail-Columbia Valley areas (2500 feet elevation) and by June 8, 20 per cent of the leaves had been 80 per cent damaged. By June 13 the larvae had scattered and were feeding individually. Cocooning began about June 27 and by July 15, cocoons were conspicuous on various trees, grasses, and shrubs. Average defoliation was approximately 80 per cent.

Egg mass sampling was carried out using both the uniform three-tree sampling method and a sequential sampling method developed by R. F. Shepherd. Table 2 shows data obtained by sequential means and by counting the total masses on three trees. The average number of eggs per mass is also shown.

Table 2

Results of Forest Tent Caterpillar Egg Mass Surveys, West Nelson District, September 1962

Locality	Crown length (ft.)	Total no. 1962 masses	Av. no. eggs in 5 masses	No. trees sequential sampling	Predicted defoliation	
					Three-tree	Sequential
Milk-Ranch Creek	20	15	153			
	21	18	197	7	heavy	light
	24	10	158			
Warfield South	32	66	156			
	30	54	233	10	heavy	light
	23	24	194			
Genelle	18	47	182			
	22	19	181	4	heavy	light
	15	8	175			
Average		29	181			

With reference to predicted 1963 defoliation in Table 2, it was noted that in two areas, Milk-Ranch Creek and Warfield South, most of the 1961 egg masses were in the upper half of the crown whereas the majority of 1962 masses were in the lower half of the crown. These would be missed by the sequential sampling system by which only upper crown branches are sampled. Sampling was not intensive enough to compare the two methods, but in the past predictions based on the total number of egg masses per tree were reasonably accurate. It is therefore reasonable to expect heavy, or at least medium defoliation, in the above areas in 1963.

During the counting of eggs in the egg mass analysis it was noted that five per cent of all dissected eggs were dark and dried out. These were most prevalent in the masses from Milkranch Creek, a three year old infestation.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Once again this insect intermingled with the forest tent caterpillar throughout the Warfield infestation. Its primary host there was western white birch. The tents were also found in small numbers from Anarchist Summit to Nelson, in the Monashee-Burton district and from Waneta to Nelway.

The earliest web was observed on May 28 at Rossland at 3200 feet elevation and the maximum elevation at which webs were noted was nearly 6,000 feet at the headwaters of Barrett Creek.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The standard 10-branch sampling method used each season indicated a static population level. The number of surfaces mined at four sample plots remained, on the average, the same as in 1961. Table 3 shows that there was a small decline in the average number of adults produced per leaf surface. Again, sampling showed that average parasitism had increased while mortality from other causes remained the same (Table 4).

Table 3

Percentage of Aspen Leaf Surfaces Mined and Adult Aspen Leaf Miners Produced per Leaf Surface, West Nelson District 1960-1962

Locality	Percentage of leaf surfaces with mines			No. of adults produced per leaf surface		
	1960	1961	1962	1960	1961	1962
Greenwood (Jewel Lk. Rd.)	56	17	19	.18	.85	.09
Grand Forks (Granby River)	33	13	11	.22	.01	.06
Phoenix	-	28	26	-	.03	.62
Crawford Creek	-	7	9	-	.02	.06
Averages	44	16	16	.20	.23	.21

Table 4

Mortality of Aspen Leaf Miners in Cocoons in 100 Cocoon Samples, West Nelson District, 1960-1962

Locality	Percentage mortality					
	Parasitism			Other Causes		
	1960	1961	1962	1960	1961	1961
Greenwood	1	8	25	9	6	1
Grand Forks	1	8	12	10	2	1
Phoenix	-	6	32	-	1	1
Crawford Creek	-	16	8	-	3	9

Pine Shoot Borer, Eucosma sonomana Kft.

Browning and drying out of ponderosa pine tips caused by the pine shoot borer increased noticeably in 1962, not only near Cascade but in the main Kettle River Valley north of Westbridge, near Rock Creek, and to a lesser extent at Boundary Creek.

A check was made of 50 ponderosa pines near Cascade Station. The average height of these trees was 25 feet and the average d.b.h. was eight inches. Sixty-two per cent were affected; the average number of tips infested was two. The upper third of the crown had four times as many infested tips as the mid-third and the lower third of the crown had none.

Spotless Fall Webworm, Hyphantria cunea (Drury)

Small numbers of webs of this arctiid, were common on a variety of hosts throughout the District in 1962. Web counts made at four localities indicate that the population increased in 1962 (see table below).

Locality	No. of miles	No. of webs 1962	No. of webs per mile	
			1961	1962
Rock Creek-Westbridge	8	98	7	12
Grand Forks-Christina Lake	13	213	11	16
Christina Lake-Cascade	4	109	-	27
Creston-Sanca	15	315	15	21

Observations indicated that the average size of web at the end of the feeding period in August was much larger than in 1961.

Webworm colonies were common at Oasis, Bunchgrass Mountain, and north of Rossland, the latter at 3,600 feet. Hosts were chokecherry, willow, domestic apple, saskatoon and alder.

An Elderberry Cutworm, Zotheca tranquilla viridula Grt.

First signs of heavy defoliation of elderberry by this colourful larva were seen on June 7 near Waneta. Damage at that time had reached about 20 per cent of the foliage by a process of combined feeding and forming small "purses" of individual leaves by closing opposite edges together with silk. This latter action was the cause of much of the defoliation by a drying out process.

The outbreak extended from Waneta up the Columbia Valley to Castlegar and into Pass Creek, Christina Lake, and along the east side of Kootenay Lake from Crawford Bay to Creston. Damage varied from a trace to 90 per cent defoliation, the most severe being in the Castlegar-Pass Creek region.

Ugly Nest Caterpillar, Archips cerasivoranus Fitch

This caterpillar had formed distinctive webs on chokecherry at Waneta, Cascade and west of Grand Forks by June 7. Although the damage was widespread, only a few bushes in each place were affected.

Yellow-necked Caterpillar, Datana ministra (Drury)

This caterpillar caused moderate defoliation of birch trees in the Christina Lake, Cascade and Laurier areas in 1962. The average defoliation per tree was approximately the same as in 1961, but a larger number of host trees were involved.

Green Spruce Looper, Semiothisa granitata Gn.

The occurrence of the green spruce looper decreased in 1962 compared with 1961. This is in contrast with the increase noted the previous year (Table 5). The larval period was June 29 to September 27, the same period as in 1961.

Table 5

Three-tree Beating Collections Containing the Green Spruce Looper, West Nelson District, 1960 to 1962

Host	Total no. of collections during larval period			Percentage of collections containing larvae			Av. no. larvae per positive collection		
	'60	'61	'62	'60	'61	'62	'60	'61	'62
Alpine fir	8	13	10	25	46	10	2	3	1
Douglas-fir	17	62	48	47	61	46	4	4	2
Engelmann spruce	8	24	23	50	54	13	2	2	1
Grand fir	3	5	6	50	60	33	2	2	4
Hemlock	15	26	38	20	46	21	5	4	3
White pine	12	3	15	16	33	6	4	0.3	4
Western red cedar	6	13	15	16	15	0	2	2	-

Larch Sawfly, Pristiphora erichsonii (Htg.)

Larvae of this well known defoliator were found in only one collection in the District in 1962. Three larvae were found in a Douglas-fir-larch-ponderosa pine stand near Cascade Station. This was the first collection of this sawfly recorded since 1956.

Douglas-fir Tussock Moth, Orgyia pseudotsugata (McD.)

For the seventh consecutive season no larvae or other signs of this liparid were found during frequent inspections of past infestation areas at Cascade Station and the Kettle River Valley.

California Tortoise-shell Butterfly, Nymphalis californica Bdv.

Approximately five acres of snowbrush near Blueberry Station were 60 per cent defoliated by larvae of this brush-footed butterfly. A similar infestation occurred just south of Castlegar airport.

Pine Butterfly, Neophasia menapia Feld.

Two larvae collected on white and ponderosa pine hosts near Crawford Bay and Boswell were the only larvae reported in six years.

Sawyer Beetle, *Monochamus* spp.

Workings of these wood-borers were noted at Cascade and Pin Creek in 1962 and flights were observed near Christian Valley in the main Kettle River Valley. At Cascade three entrance holes were noted under a square foot sample of bark in the dead top of a ponderosa pine tree. This top had been killed by *Ips oregoni* (Eichh.) in 1961.

At Pin Creek, a cold deck of alpine fir and larch right-of-way logs cut in September 1960, was infested by *Monochamus* larvae. The deck was at an altitude of 4700 feet.

Log decks in a mill yard near Fiva Creek, October 2, were examined for *Monochamus*; in less than an hour 20 adults, some perching and others in flight, were counted. The logs were primarily freshly cut Douglas-fir.

Western Pine Beetle, *Dendroctonus brevicomis* Lec.

A small group of ponderosa pine trees two miles west of Grand Forks was inspected on July 4 for beetle broods. Thirteen trees, 10 to 12 inches in diameter had been attacked by this beetle in 1960, and six were attacked in 1961. Although one adult *D. valens* was found, the pitch blobs typical of the western pine beetle were most prominent and losses were attributed to *D. brevicomis* Lec.

Poplar and Willow Borer, *Sternochetus lapathi* (L.)

Samples or records of this borer were taken near Edgewood, Lower Arrow Lake, Needles, and Upper Hanna Creek. Near Edgewood adults were observed, and fresh attacks had occurred in a group of two to three inch willow stems having a common root-collar. The area was under 12 inches of water for much of the year. The infestation continued at Upper Hanna Creek, north of Rossland, where recurring attacks have damaged many square miles of willow bushes (Fig. 1).

Douglas-fir Needle Midges, *Contarinia* spp.

The Douglas-fir needle midges caused severe damage at two localities in 1962. The first was near Deer Park, Lower Arrow Lake where 90 per cent of the needles of seedling Douglas-firs were infested, and Kuskanook, where similar damage was done to needles on pole-sized and mature Douglas-fir trees.

Poplar Borer, *Saperda* sp.

Attacks by the poplar borer were noted near the Trail golf course and near the east summit of the Cascade Road. At the golf course 50 random aspen stems ranging from three to five inches d.b.h. were examined; 15 of the trees had at least two galleries each. A six inch aspen on the Summit Road contained at least one larva. This tree was at 4,000 feet elevation.

Cicadas, Cicadidae

Extensive egg-niche damage caused by cicadas was observed in the Christina Lake area on mountain alder, white birch, cherry, and red-osier dogwood branchlets. In early June as many as 10 ovipositing females were seen on a five foot branch at one time. Damage was very obvious on most bushes; no egg niches were observed on small conifers.

Cooley Spruce Gall Aphid, Adelges cooleyi (Gill.)

Galls were formed on about 40 per cent of the available tips of some Engelmann spruce trees along the Conkle Lake Road, at Kettle Crossing, and Johnstone Creek (Lower Arrow Lake).

A Woolly Aphid on Western Hemlock, Adelges tsugae Annand

The woolly stage of the hemlock gall aphid was excessive on one eight inch d.b.h. hemlock near Procter. The white "wool" was on branches and on the ground below, literally as heavy as snow. A few sapling hemlock trees on the slopes near Gladstone Creek were infested, but the attacks were much lighter in intensity.

Pine Needle Miner, Zelleria haimbachi Busck

This insect mined and killed about 60 per cent of the current year's needles on lodgepole pine at Bowman Creek, Lower Arrow Lake. Three acres were affected.

Five larvae were collected from ponderosa pine at Windfall Creek and Kinnaird.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

This beetle has caused the loss of many thousands of alpine fir trees in the high plateau country north and south of the Monashee Highway and near Upper Fife and Coalgoat creeks. These areas are above 4,500 feet elevation. Aerial examinations of these regions show that the attacks are continuing.

Sawflies on Conifers, Neodiprion spp.

Populations of these sawflies on western hemlock and Douglas-fir have fluctuated only slightly in recent years while the occurrence on lodgepole pine has increased for three consecutive years. No severe defoliation is expected at the population levels shown in Table 6.

Table 6

Summary of Conifer Sawfly Collections by Host Trees, West Nelson District, 1960-1962

Host	No. coll. during larval period			Percentage coll. containing species			No. of specimens per collection		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
Western hemlock	15	25	32	40	32	44	10	36	37
Douglas-fir	23	65	77	43	31	22	3	3	2
Lodgepole pine	6	21	17	16	28	53	1	2	3

Western Hemlock Looper, Lambdina fiscellaria lugubrosa Hlst.

The following is a summary of the occurrence of hemlock looper larvae in collections: Douglas-fir, five; grand fir, three; Engelmann spruce, one; western larch, three; western hemlock, two and western red cedar, one. Comparison of the above counts with collections from the same hosts in 1960 and 1961 showed no notable variations.

Engraver Beetles, Ips spp.

Damage by Ips beetles appeared light and widespread over the District in 1962. There was no recurrence of the serious top-kill of ponderosa pine trees which took place near Danville in 1961. Two dead tops were seen near Cascade and two more near McCarren Creek. Many Ips were found in conjunction with Dendroctonus beetles but the initial damage was attributed to the latter.

MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
Acleris variana (Fern.)	Ba, F, H	6	increase on H
Caripeta divisata Wlk.	Ba, F	4	decrease
Choristoneura fumiferana (Clem.)	Ba, F, H	12	increase in occurrence

Insect	Host	No. of collections	Remarks
Ectropis crepuscularia Schiff.	Ba, C, F, H	9	general decrease
Melanolophia imitata Wlk.	Se, Pw, Ba, Bg, F, H, L	31	general decrease
Nepytia canosaria Wlk.?	F, H	9	decrease
Orgyia antiqua badia Hy. Edw.	Dt, L, W	5	increase

STATUS OF FOREST DISEASES

Ponderosa Pine Needle Cast

Elytroderma deformans (Weir) Darker caused greater needle damage in 1962 than in 1961 in the high country between Anarchist Summit and Johnstone Creek Campsite. No estimates of foliage loss were made but browning and drying was very obvious in June and early July. Further evidence of this blight was seen on ponderosa pine near Kuskanook, Kootenay Lake.

Larch Needle Cast

The heaviest infection by *Hypodermella laricis* Tub. was seen in the Goat River Valley east of Creston where many larch saplings were injured and in the Barnes Creek Valley, Needles, where at least five acres of larch saplings were affected. Trees were affected singly or in groups at Warfield, Renata, and Moody Creek while at least 100 acres of the same host, near Clearwater Creek, Nelson, had turned a prominent orange colour by June 6.

White Pine Blister Rust

Cronartium ribicola J. C. Fisch. continued to cause mortality in the District. The most heavily infected area appeared to be the Kokanee Creek Valley north of Nelson. Fifty old grey and 47 red white pine trees were counted at one point nine miles up the Valley. Many more showed heavy pitching related to stem cankers. To a lesser degree the same condition is occurring in the Summit Creek Valley, west of Creston, where at one point, 12 randomly chosen white pine trees, averaging 10 inches d.b.h, were examined and 11 had either turned red or showed pitch exudation along the stem. In the Upper Sheep Valley, southeast of Salmo, 107 red trees were tallied on August 14 and on August 3, 43 reddened white pines with typical symptoms were counted on the west side of Cottonwood Lake, south of Nelson.

Melampsora Rust of Trembling Aspen

In connection with the pine-infective Melampsora sp. discovered at Telkwa, 21 samples were made in the West Nelson District to determine the distribution of Melampsora albertensis Arth. in its uredinial state (see Foreword). In addition to an established sampling technique used, four 150-leaf samples were collected randomly and 10 leaves were picked from these. These leaves, by visual estimate from the ground, were not deemed to have a heavy infection but a close examination revealed they had 63 uredinia per half square inch.

From the standpoint of infection intensity, 57 per cent of the samples were free from infection, nine per cent bore light infection, nine per cent were in the moderate class and 25 per cent had a heavy degree of infection. All heavily infected areas had lodgepole pine present and four of these areas had Douglas-fir as well. Only one heavily infected point had other pine species included in the stand. A summary of locations was studied, and indicated that the infection was widespread throughout the District. In some cases sample areas relatively close together had widely varied degrees of infection.

Rodent Damage

Severe damage by rodents was noted in two areas. The first area was up the Pin Creek access road where the top four to eight feet of over 100 larch saplings, from one to three inches d.b.h., were dying as a result of bark removal by a rodent. A similar situation was evident on larch east of Sheep Lake along the Blueberry Cutoff.

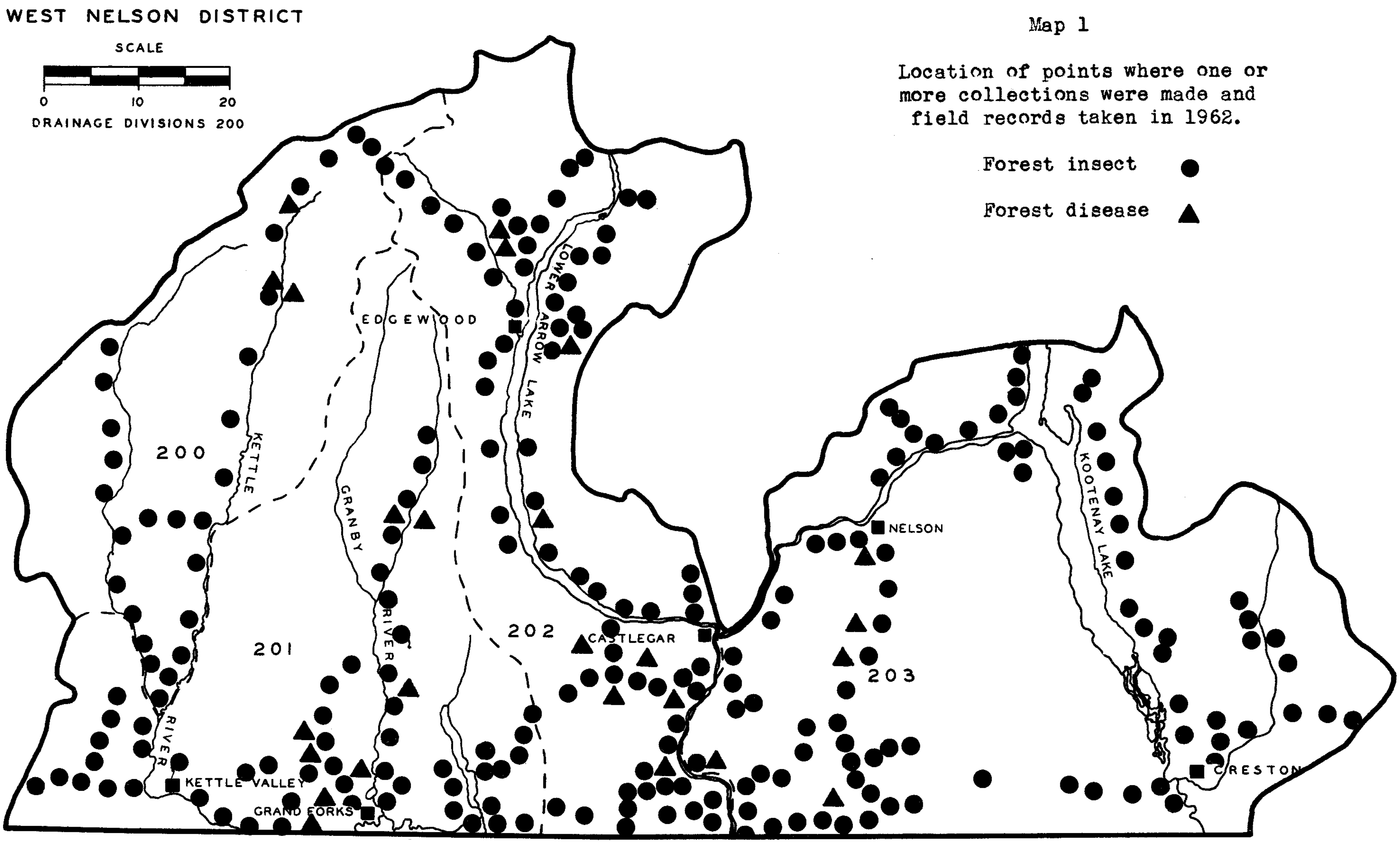
Fume Damage

On August 27 a Forest Service request led to the investigation of a strip of timber on the slope behind Celgar Pulp Mill. The needles on all larch trees varying in size from two to 16 inches d.b.h., were turning brown back from the tips. A collection sent to the Victoria Forest Pathology Laboratory showed the symptoms to be consistent with fume damage. The area concerned was approximately one quarter of a mile wide by two miles long, the upper edge of which was approximately 400 feet above the Columbia River.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Black hawthorn	Gymnosporangium betheli Kern	Burrell Creek	alternate host for juniper rust
Douglas-fir	Polyporus schweinitzii Fr.	Gladstone Creek	root and trunk rot uncommon around Lower Arrow Lake.

Host	Organism	Locality	Remarks
Western hemlock	*Echinodontium tinctorium* E. & E.	Shields Road	notable for lack of infection here
Western larch	*Armillaria mellea* (Vahl.) Quel.	Glade Creek	root rot, new host record
Western larch	*Fomes officinalis* (Vill. ex Fr.) Neuman	Christian Valley	trunk rot on 36 inch log



Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲

Map 2

Tree mortality caused by mountain pine beetle in 1960 and 1961 as determined in 1962.

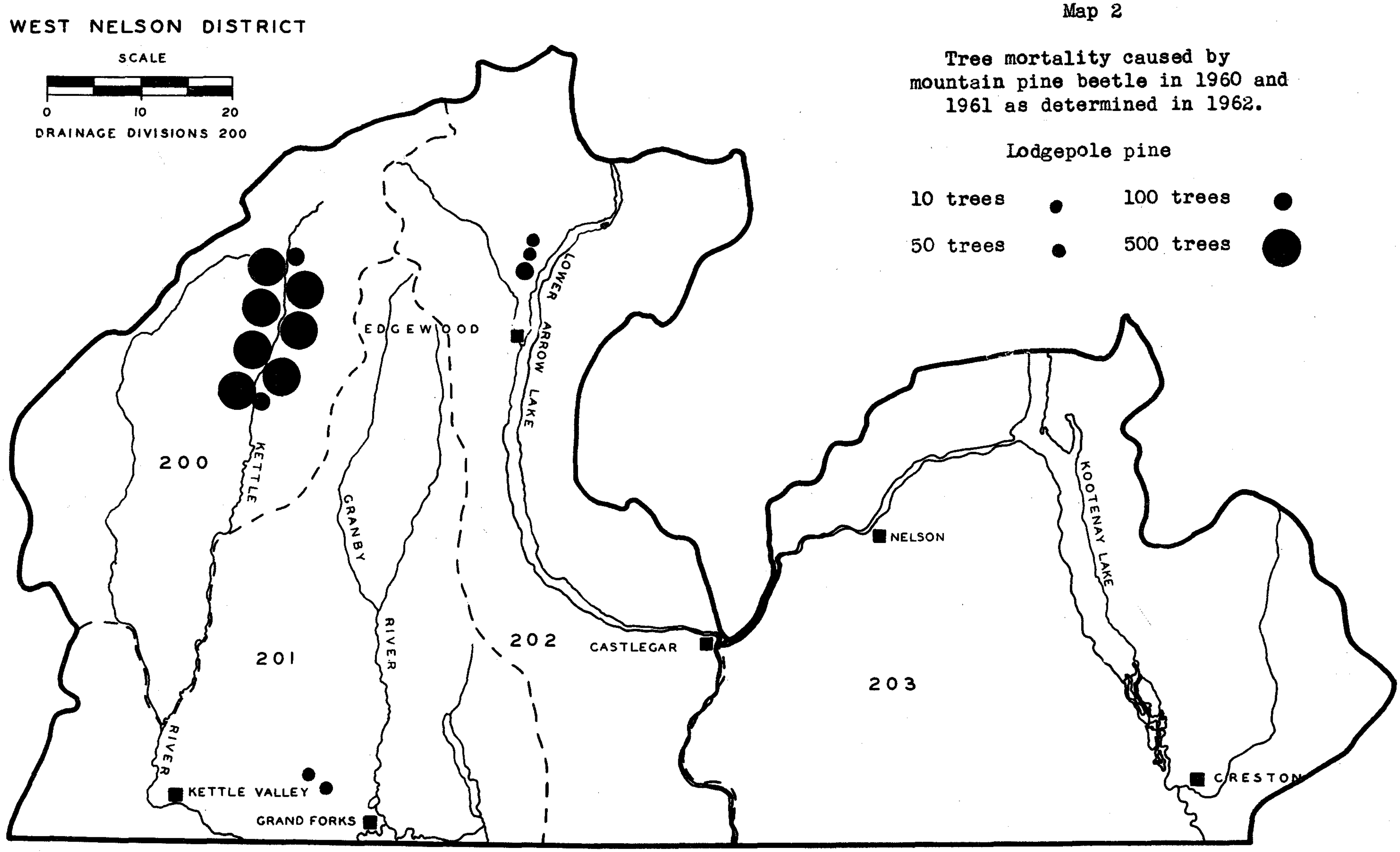


Fig. 1. Sternochetus lapathi (L.). Representative of chronic damage area north of Rossland, July, 1962. D.W. Taylor.

FOREST INSECT AND DISEASE SURVEY

CENTRAL NELSON DISTRICT

1962

ANNUAL REPORT

FOREST INSECT AND DISEASE SURVEY

CENTRAL NELSON DISTRICT

1962

R. O. Wood

INTRODUCTION

Two weeks were spent on cabin maintenance at Wasa and Williams Lake during the month of April. Field work in the Central Nelson District commenced on May 8 and continued until September 14. A total of seven hours and 30 minutes was used in aerial surveys in the District in 1962. During the field season three weeks were spent assisting in other districts.

In 1962 the number of permanent sample plots was increased to 35; each plot was sampled from one to four times.

Table 1 lists by hosts the 346 forest insect and 49 forest disease collections submitted in 1962; Map 1 gives the location points of these collections.

Table 1

Collections by Hosts

Central Nelson District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	22	0	Alder spp.	3	2
Douglas-fir	66	5	Aspen, trembling	1	16
Fir, alpine	8	2	Birch, western white	7	0
Fir, grand	1	0	Maple, Douglas	1	0
Hemlock, mountain	2	0	Willow spp.	1	2
Hemlock, western	88	2	Miscellaneous	38	12
Larch, western	11	2			
Pine, lodgepole	23	3			
Pine, ponderosa	3	0			
Pine, western white	40	1			
Spruce, Engelmann	29	1			
Yew, western	2	1	Total	51	32
Total	295	17	Grand total	346	49

STATUS OF FOREST INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Tree mortality caused by the mountain pine beetle, as indicated by aerial reconnaissance flights over parts of the Central Nelson District, increased greatly in 1962. The areas of greatest tree mortality were the Upper Arrow Lake watershed, along the Columbia River from Arrowhead to Boat Encampment and along the Canoe River from its junction with the Columbia River to the northern boundary of the District at Hughallan Creek. There was also an increase in beetle activity from Beaton to Trout Lake and along the Lardeau River.

Table 2 gives the number and general location of red tops counted, or in some areas estimated, from aerial reconnaissance in 1962. This table also gives a comparison of the number of red tops counted in the same areas in 1961. Lodgepole pine mortality reported at Enterprise Creek in 1960 and 1961 is now believed to be mostly western white pine. These trees are in an inaccessible area and were closely observed for the first time in 1962.

Table 2

Comparison of Mortality of Western White Pine Caused by the Mountain Pine Beetle in 1960 and 1961 as Determined from Aerial Surveys, Central Nelson District, 1962

Location	No. of red tops	
	1960	1961
West side Upper Arrow Lake	893	3108
Columbia River (Arrowhead to Revelstoke)	186	1845
Rogers Pass Highway	0	150
Columbia River (Revelstoke to Boat Encampment)	not counted	812
Canoe River	not counted	540
East side Upper Arrow Lake	560	2326
Beaton to Trout Lake	45	1081
Lardeau River	24	198
Kootenay Lake (Lardeau to Kaslo)	65	211
Slocan Lake watershed	298	860
New Denver to Nakusp	50	396
Totals	2,121+	11,527

The average d.b.h. and height of beetle-killed western white pine in the Central Nelson District has been estimated at 14 inches and 96 feet respectively (1961 Central Nelson District Annual Report). "The Standard Cubic - Foot Volume Tables" recently published by the British Columbia Forest Service gives the volume of a western white pine of this size as 42 cubic feet. This would give an estimated total volume loss of 89,082 cubic feet in 1960 and 484,134 cubic feet in 1961, an increase of 395,052 cubic feet.

Engelmann Spruce Beetle, *Dendroctonus engelmanni* Hopk.

Spruce beetles were active again in 1962 in the area above Shelter Bay, Upper Arrow Lake. In July, 1961, foresters for Celgar Ltd. cruised the area and obtained information on two 2-acre plots as follows:

Plot no.	Av. max. height (feet)	Diameter range (inches)	Number of trees	Percentage		
				healthy	dead	infested
1	120	8 - 50	65	46.1	10.8	43.1
2	140	10 - 34	61	83.6	4.9	11.5

The infested area covered an estimated 300 to 400 acres at elevations of 4000 to 4500 feet. Sanitation logging was being carried out when the area was visited in early September, 1962, and examination of numerous stumps and blowdown showed a very low population of beetle larvae.

Spruce beetle damage was also found at Evans Lake in early August. Two Engelmann spruce trees of approximately 20 inches diameter contained living larvae, and numerous old grey trees bore indications of past activity of the insect. This area is above 5000 feet and is accessible only by air, consequently it would be very difficult to make further studies of the beetle population at this location.

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopk.

No 1961 attacks on Douglas-fir trees by bark beetle were observed in the Central Nelson District in 1962.

Western Balsam Bark Beetle, *Dryocoetes confusus* Sw.

An estimated 175 red-topped alpine fir trees were noted from aerial reconnaissance in 1962 in the general area around Beatrice and Evans lakes. The trees were in groups of five to 60 trees and most were estimated to be over 5000 feet in elevation.

Aspen Leaf Miner, *Phyllocnistis populiella* Cham.

The five permanent sample plots established in the Central Nelson District for studies of the aspen leaf miner showed an increase in the percentage of leaf surfaces infested by the insect at three plots in 1962; at the remaining two the percentage decreased (Table 3). The number of adults produced per leaf surface increased in all plots. The status of the leaf miner population in 1962 was deduced from an examination of an average of 355 leaves at each plot.

Table 3

Comparison of Aspen Leaf Surfaces Mined and Number of Adults Produced per Leaf Surface at Five Plots, Central Nelson District, 1960 - 1962

Locality	Percentage of leaf surfaces with mines			No. of adults produced per leaf surface		
	1960	1961	1962	1960	1961	1962
4 miles north of Revelstoke	98	74	78	0.58	0.55	0.56
8.5 miles south of Revelstoke	99	92	90	0.41	0.39	0.53
Summit Lake (south of Nakusp)	96	29	37	0.6	0.04	0.14
8.5 miles east of New Denver	85	63	47	0.54	0.46	0.47
Winlaw	-	43	63	-	0.14	0.34

Parasitism decreased in four of the five plots in 1962 (Table 4). Mortality from other causes was insignificant.

Table 4

Comparison of Mortality of Aspen Leaf Miner in 100-Cocoon Samples at Five Localities, Central Nelson District, 1960 to 1962 Inclusive

Locality	Percentage mortality					
	Parasitized			Other causes		
	1960	1961	1962	1960	1961	1962
4 miles north of Revelstoke	-	16	11	-	0	2
8.5 miles south of Revelstoke	33	34	25	1	0	1
Summit Lake	10	13	36	2	0	1
8.5 miles east of New Denver	13	11	7	3	2	2
Winlaw	-	14	13	-	2	1

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Table 5 gives a comparison of hemlock looper populations on six coniferous hosts in all drainage divisions in the District as shown by three-tree beating collections taken in 1960 to 1962 inclusive from western hemlock, Douglas-fir, Engelmann spruce, western red cedar, western larch and alpine fir.

Sixty-nine samples collected from western hemlock in the Central Nelson District during the larval period of the insect in 1962 (June 1 to August 9) showed an increase in the percentage of collections containing larvae. The average number of larvae per positive sample remained about the same in most drainage divisions. First instar larvae were collected as late as the third week in June, indicative of the late season.

Table 5

Three-tree Beating Collections of Western Hemlock Looper from Six Coniferous Hosts, Central Nelson District, 1960 - 1962

Drainage division	Total collections during larval period			Percentage of collections with larvae			Av. no. of larvae per positive sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
220	38	34	4	3	9	25	1	1	1
221	20	28	22	0	0	5	-	-	1
222	16	5	2	0	0	50	-	-	1
223	14	36	49	7	11	29	1	1	2
224	-	2	11	-	0	9	-	-	5
225	42	49	68	29	22	24	2	2	2
	130	154	156	11	12	22	2	2	2

False Hemlock Looper, Nepytia canosaria Wlk.?

Populations of this insect on Douglas-fir in the Central Nelson District were low in 1962; 10.3 per cent of the Douglas-fir collections contained an average of 1.5 larvae per positive sample.

A collection from western hemlock at Halfway Creek Crossing yielded four larvae, and three larvae were taken from hemlock in two collections in the Cranberry Creek area of Upper Arrow Lake.

Spruce Budworm, Choristoneura fumiferana (Clem.)

The percentage of Douglas-fir collections containing spruce budworm, and the number of larvae per positive sample increased in the vicinity of

Revelstoke in 1962, but defoliation was negligible. Few larvae were collected in other areas of the District.

Table 6 compares the results of collections made on Douglas-fir in all drainage divisions of the Central Nelson District in 1961 and 1962.

No budworm larvae were collected from Engelmann spruce in 1961; in 1962 they occurred in 20 per cent of the collections with an average of 2.0 larvae per positive sample. The proportion of collections from western hemlock containing larvae increased from six per cent in 1961 to 19 per cent in 1962; the average number of larvae per positive sample rose from 1.0 in 1961 to 2.6 in 1962.

Table 6

Collections of Spruce Budworm in Three-tree Samples from Douglas-fir, Central Nelson District, 1961 and 1962.

Drainage division	Total collections during larval period		Percentage of collections with larvae		Av. no. of larvae per positive sample	
	1961	1962	1961	1962	1961	1962
220	9	1	0	0	-	-
221	8	7	0	14	-	1
222	-	-	-	-	-	-
223	13	14	15	14	2	1
224	-	-	-	-	-	-
225	5	13	40	46	2	8
	35	35	11	26	2	6

Black-headed Budworm, <u>Acleris variana</u> (Fern.)

Only four black-headed budworm larvae were collected in 1962. All collections were from western hemlock along the Big Bend Highway and at Arrowpark Creek (Upper Arrow Lake).

Green Spruce Looper, <u>Semiothisa granitata</u> Gn.

Collections of this insect from western hemlock in the District ranged from 2.0 larvae per positive sample along the Big Bend Highway to 11.5 in the Upper Arrow Lake area. The average number of larvae per collection increased compared with 1961, but the percentage of collections containing larvae remained constant (Table 7). Larvae were collected July 1 to September 7.

Table 7

Collections of Green Spruce Looper from Three Coniferous Hosts, Central Nelson District, 1960 - 1962

Hosts	Total collections during larval period			Percentage of collections with larvae			Av. no. of larvae per positive sample		
	1960	1961	1962	1960	1961	1962	1960	1960	1962
Western hemlock	40	56	37	23	77	32	3	7	8
Engelmann spruce	14	12	10	0	58	30	-	6	6
Douglas-fir	24	38	23	29	76	61	3	4	4
	78	106	70	19	72	41	2	6	6

A Hemlock Sawfly, Neodiprion sp.

A total of 217 sawfly larvae were collected in 60 beating samples from western hemlock from June 12 to August 16. The percentage of positive collections was 33.3 with an average of 10.8 larvae per sample. The only location where larvae exceeded 50 per collection was Potlatch Creek, Mile 94, Big Bend Highway.

An Ambrosia Beetle, Trypodendron lineatum (Oliv.)

Adults of this beetle were found in standing Engelmann spruce killed by Dendroctonus engelmanni Hopk. in the Shelter Bay region of Upper Arrow Lake. Heavy attacks on log decks in the area were reported in 1961, but no damage to logs was observed in 1962. Ambrosia beetle attacks were light in 1962. Galleries had penetrated up to 1.5 inches on June 22.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Larval attacks occurred on willow and black cottonwood in areas from the southern part of the District to 10 miles north of Revelstoke along the Big Bend Highway. A light attack on Populus gelrica at Marblehead was noted on June 14, the first record for this host in the Central Nelson District. A number of willow and some black cottonwood at Summit Lake suffered moderate to heavy attacks; trembling aspen was not attacked. A summary of the examination of the three tree species at Summit Lake is shown below:

Host	Number examined	Percentage			
		Healthy	Green infested	Partially dead	Dead
Willow (clumps)	30	20	43	30	7
Black cottonwood	5	60	40	0	0
Trembling aspen	15	100	0	0	0

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The forest tent caterpillar population reached infestation proportions in two localities of the Central Nelson District in 1962. A spot infestation of seven to 10 acres was noted at Slocan Park in the southern part of the District; cocoons were very numerous on trees and undergrowth on July 14. Defoliation was estimated as follows: alder - 100 per cent; western white birch - 80 to 100 per cent; trembling aspen - 90 per cent; black cottonwood - 20 to 80 per cent. Of 100 cocoons collected and reared from this area, 61 adults emerged, 18 were parasitized and 21 died from unknown causes.

At Summit Lake, where an estimated 40 acres suffered 100 per cent defoliation, two plots were established for egg sampling. The old method of egg sampling (all egg masses from each of three trees) and the more recent sequential sampling method were both used. A comparison of both methods is shown in Table 8.

Table 8

Comparison of Methods of Egg Sampling for Forest Tent Caterpillar, Central Nelson District, 1962

SEQUENTIAL SAMPLING:

Plot no.	Tree no.	Height (ft.)	D.b.h. (in.)	No. of egg masses	Predicted defoliation for 1963
1	1	35	5	0	
	2	33	5	1	
	3	34	4	1	
	4	40	5	0	
			Total	2	light
2	1	46	7	1	
	2	34	3	0	
	3	42	7	0	
	4	34	3	1	
			Total	2	light

OLD METHOD:

Plot no.	Tree no.	Height (ft.)	D.b.h. (in.)	No. of egg masses	Predicted defoliation for 1963
1	1	35	5	9	
	2	33	5	20	
	3	34	4	11	
Averages		34	5	13	heavy
2	1	46	7	9	
	2	34	3	3	
	3	42	7	14	
Averages		40	6	9	moderate

The 1950 Annual Report of the Forest Insect Survey for Ontario states: "Larvae emerging from 10 egg clusters on trees averaging six inches in diameter and from six egg clusters on smaller trees will cause heavy defoliation". Based on this method, severe defoliation can be expected in 1963; according to the sequential method it will be light.

The difference between the two methods was caused by the majority of the egg clusters being on the lower crown of the trees; this would naturally affect the accuracy of the sequential sampling method where two 18-inch branches from the upper crown exclusive of the leader are used. Five egg masses were examined at each of the two plots. Plot 1 had from 112 to 224 eggs per cluster with an average of 168.8; at plot 2 they ranged from 185 to 211 eggs per cluster with an average of 194.2 Heavy flights of adults were observed in Nakusp, New Denver and Slocan City in early August.

Western Tent Caterpillar, *Malacosoma pluviale* Dyar

Tents of this defoliator were common on deciduous hosts throughout the surveyed parts of the District in 1962. An interesting occurrence at Summit Lake was the presence of tent caterpillar webs at the very tops of western white birch trees, many of which exceeded 50 feet in height.

A Douglas-fir Cone Moth, *Barbara colfaxiana* Kearf., and a Cone Pyralid, *Dioryctria abietivorella* (Grote).

Douglas-fir cones in the Central Nelson District were host to these two insects in 1962. At many locations the cone crop was very light and collecting was unproductive unless numerous trees were felled, hence only two 60-cone collections were taken. The following table shows the results of the examinations made on August 15.

Location	Percentage of cones infested by *B. colfaxiana*	*D. abietivorella*	Percentage uninfested
Thrums	40.0	41.6	18.4
Winlaw	31.7	46.7	21.6

A Weevil in Western Red Cedar, *Hexarthrum* sp.

Attempts to find living weevil specimens of the genus *Hexarthrum* along the Big Bend Highway were successful in 1962. Several adults were collected in cull material from overmature cedar at a shake-splitting operation at Mile 34. The material in which the insects were found came from the lower bole of the tree, again indicating that the insect is active throughout most of the length of the tree rather than only the upper portion as earlier reported. Losses caused by this weevil to shingle and shake material in British Columbia are at present believed to be light, but information available on the insect is insufficient for an accurate appraisal.

Weevils in Western White Pine, *Pissodes* spp.

In 1962 several collections of roots of seedling western white pine containing weevil larvae were submitted from the Central Nelson District to Dr. S. G. Smith of the Forest Entomology Laboratory at Sault Ste. Marie. Specimens from Birch Creek, Big Bend Highway, and Enterprise Creek, south of New Denver, were identified as *Pissodes curriei* Hopk., establishing the host record of this insect as the root collar of western white pine. Collections from Arrowpark Creek and from east of New Denver have not yet been identified but are believed to be a different species.

A total of 59 red-topped western white pine seedlings and saplings (up to two inches in diameter) were examined at 13 locations in the District in 1962 to determine the distribution of the insect. Unidentified species of the weevil were common throughout most of the District with 30.5 per cent of the examined trees containing larvae. All of the examined trees were suffering from blister rust or root rot; in some cases both diseases were present.

Spotless Fall Webworm, *Hyphantria cunea* Drury

Webs of this insect increased in numbers in the southern part of the Central District in 1962. On August 14 a survey was made from a slow moving vehicle for one mile along one side of the road between Castlegar and Shoreacres; three webs were counted on willow, five on chokecherry and one on western white birch. Occasional webs were observed on various deciduous hosts in the Slocan Valley as far north as Slocan City.

A Leaf Blotch Miner, *Lyonetia* sp.

Stands of willow and western white birch were heavily attacked by this blotch miner in parts of the Central Nelson District in 1962. Trees in the southern portion of the District were lightly infested in scattered localities, but in the northern areas they showed up as solid red masses when the annual aerial reconnaissance was done in June. Heaviest areas of the infestation were Trout Lake, along the Canoe River and its tributaries and parts of the Columbia River watershed from Revelstoke to Boat Encampment.

Pine Root Weevil, *Hylobius* prob. *warreni* Wood

On June 1, 10 dead or dying white pine saplings at Kuskanax Creek (north of Nakusp) were examined with the following results: five red-topped trees were completely girdled and believed killed by the pine root weevil; two trees killed by the organism *Armillaria mellea* (Fr.) Kumm., two trees with yellowing foliage were infested with weevil larvae. The average diameter of the examined trees was two inches. No other specimens of this insect were collected in the Central Nelson District in 1962.

Pine Butterfly, *Neophasia menapia* Feld.

One larva of the pine butterfly was collected on July 12 from lodgepole pine along the shore of Galena Bay, Upper Arrow Lake. During the latter part of August, adults were observed in flight singly and in groups of two or three from New Denver to Slocan City. The heaviest concentration of adults was on the west side of the Slocan River at Slocan City where as many as six adults were in flight around the tops of coniferous trees; no defoliation was apparent.

Jack Pine Needle Miner, *Zelleria haimbachi* Busck

The plot established in 1960 at Evans Creek for studies of this needle miner was not examined in 1962 until August 18; by this time larvae had pupated. A few empty pupal cases of the needle miner and some pupae of an unidentified parasite were noted amongst the needles of infested branch tips. An estimated 10 to 75 per cent of the branch tips of many lodgepole pine trees had been damaged.

OTHER NOTEWORTHY INSECTS

Insect	Host	No. of collections	Remarks
Anomogyna mustelina Sm.	H, F, Pw, Se	13	common defoliator
Anoplonyx laricivorus R. & M.	L	3	most numerous at Kaslo
A. occidens Ross	L	2	low population in 1962
Caripeta divisata Wlk.	H, F, C	13	common defoliator

Insect	Host	No. of collections	Remarks
Cecidomyiidae	cones of western red cedar	1	50-cone sample; 33 per cent infested at Kaslo
Contarinia sp.	F	2	Upper Arrow Lake D.-fir needle miner
Ectropis crepuscularia Schiff.	H, F, L, Pw, Pl, C	21	most numerous on western hemlock
Epirrita autumnata omissa Harr.	H, L	5	very light population
Eucosma sonomana Kearf.	Pl	1	Slocan City
Hypagyrtis piniata Pack.	H, F, Se, Pw, Pl	24	most common on western hemlock
Melanolophia imitata Wlk.	H, F, Py, Se	17	common defoliator; slight decrease in population
Nematocampa filamentaria Gn.	H, F, C, Pw, Se	18	most common on western hemlock
Parorgyia grisefacta Dyar	H, F, Pw, Se	7	increase in population from 1961
Phloeosinus punctatus Lec.	C	2	New Denver - Kaslo road. Several western red cedars with heavy population
Pikonema dimmockii (Cress.)	Se	6	highest numbers along Big Bend Highway
Panthea spp.	H, F, Py, Pw, Pl	10	more common in 1962
Protoboarmia p. indicataria Wlk.	H, F, Ba, L, C, Yew, Se, Pw, Pl	28	most common on western hemlock

STATUS OF FOREST DISEASES

Important Diseases

A Melampsora Rust on Trembling Aspen

In connection with a rust found on yellow pine at Telkwa, B. C., (see introduction) a survey was made to determine the occurrence of a rust caused by *Melampsora albertensis* Arth. on trembling aspen in the Central Nelson District in 1962.

During the latter part of May three collections of over-wintered aspen leaves were made in the southern part of the District; all collections were lightly infected with the telial stage of *M. albertensis*. Examinations of hard pines in the District during the early summer failed to disclose signs of the aecial stage of the rust. During August, 14 samples of 50 leaves from each of three trees were taken from Thrums in the south to Mile 25, Big Bend Highway. Infection by uredinial stage ranged from light to moderate in all sampled areas.

Larch Needle Cast

Moderate infection by *Hypodermella laricis* Tub. in stands of western larch at Rapid Creek on the Lardeau River and at Halfway Creek north of Nakusp were observed from aerial surveys on July 4. Several acres at both locations showed the characteristic browning of needles associated with the disease.

Exotic Plantations

Examination of the eight exotic plantations in the Central Nelson District was made on August 8 and 9; the results are found in Table 9.

Table 9

Examination of Exotic Plantations in the Central Nelson District, 1962

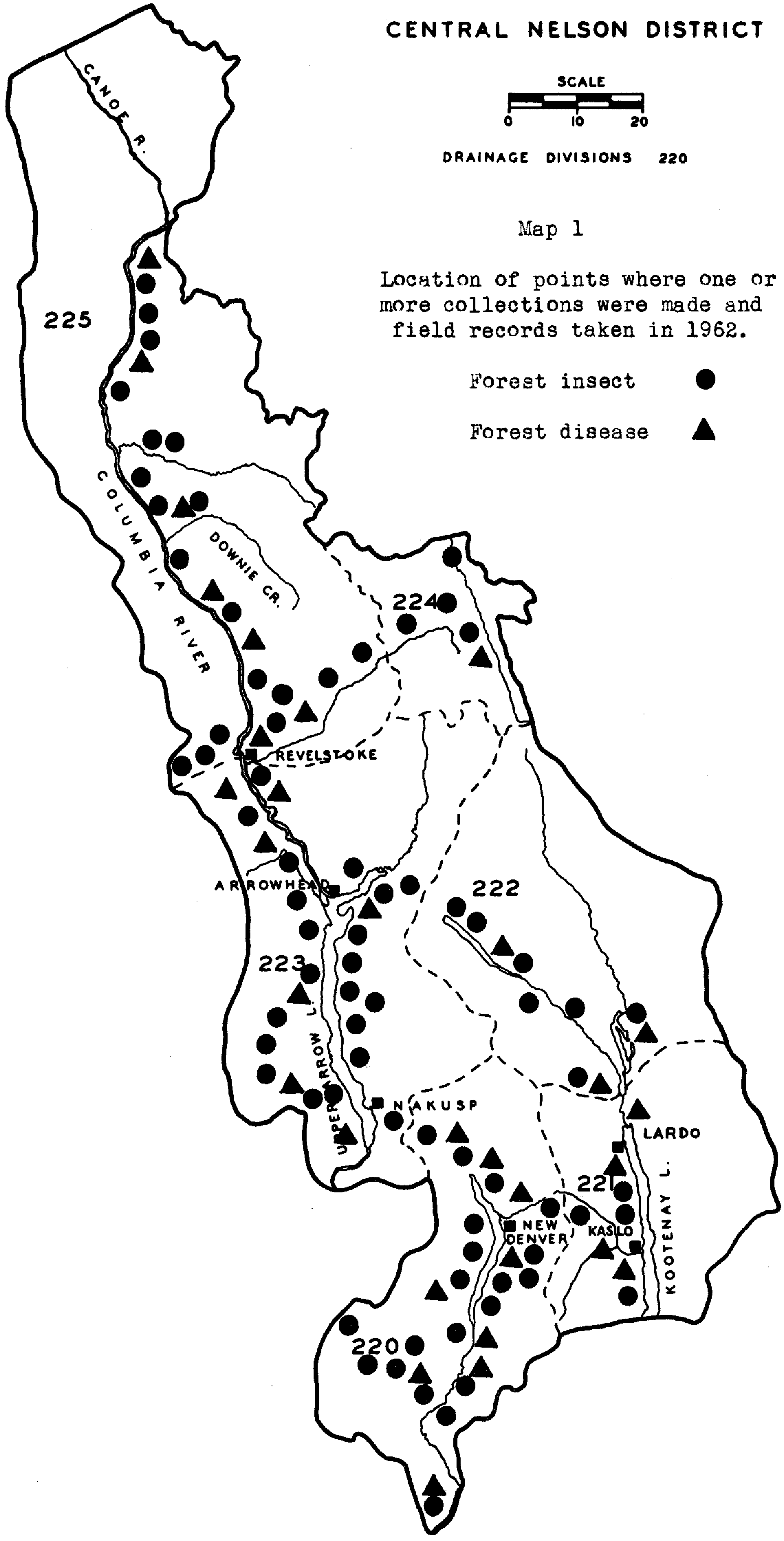
Plantation no.	Tree sp.	Locality	Remarks
XP 167	Hybrid *Populus* spp.	Marblehead	Approximately 85 per cent green and healthy. A few trees dead and some showing die-back with recovery from roots
XP 168	Hybrid *Populus* spp.	Kootenay Lake (Lardeau District)	Estimated 20 per cent die-back, 5 per cent dead and severe damage from grazing animals

Plantation no.	Tree sp.	Locality	Remarks
XP 213	Hybrid *Populus* spp.	Mosquito Landing	This area had 100 per cent failure, possibly because of fall planting.
XP 214	Hybrid *Populus* spp.	Meadow Creek	Less than five per cent healthy. Many trees completely girdled by rodents. Sprouting indicates that trees may recover from roots.
XP 215	Hybrid *Populus* spp.	Jack's Ranch (Marblehead)	Very little survival.
XP 216	Sitka spruce	Mosquito Creek	Seedlings developing satisfactorily.
XP 217	Sitka spruce	Low Pass Camp	Plantation not located.
XP 218	Sitka spruce	Plante Creek	A dense cover of *Rubus* sp. makes it difficult to find seedlings; good development on those examined.

OTHER NOTEWORTHY DISEASES

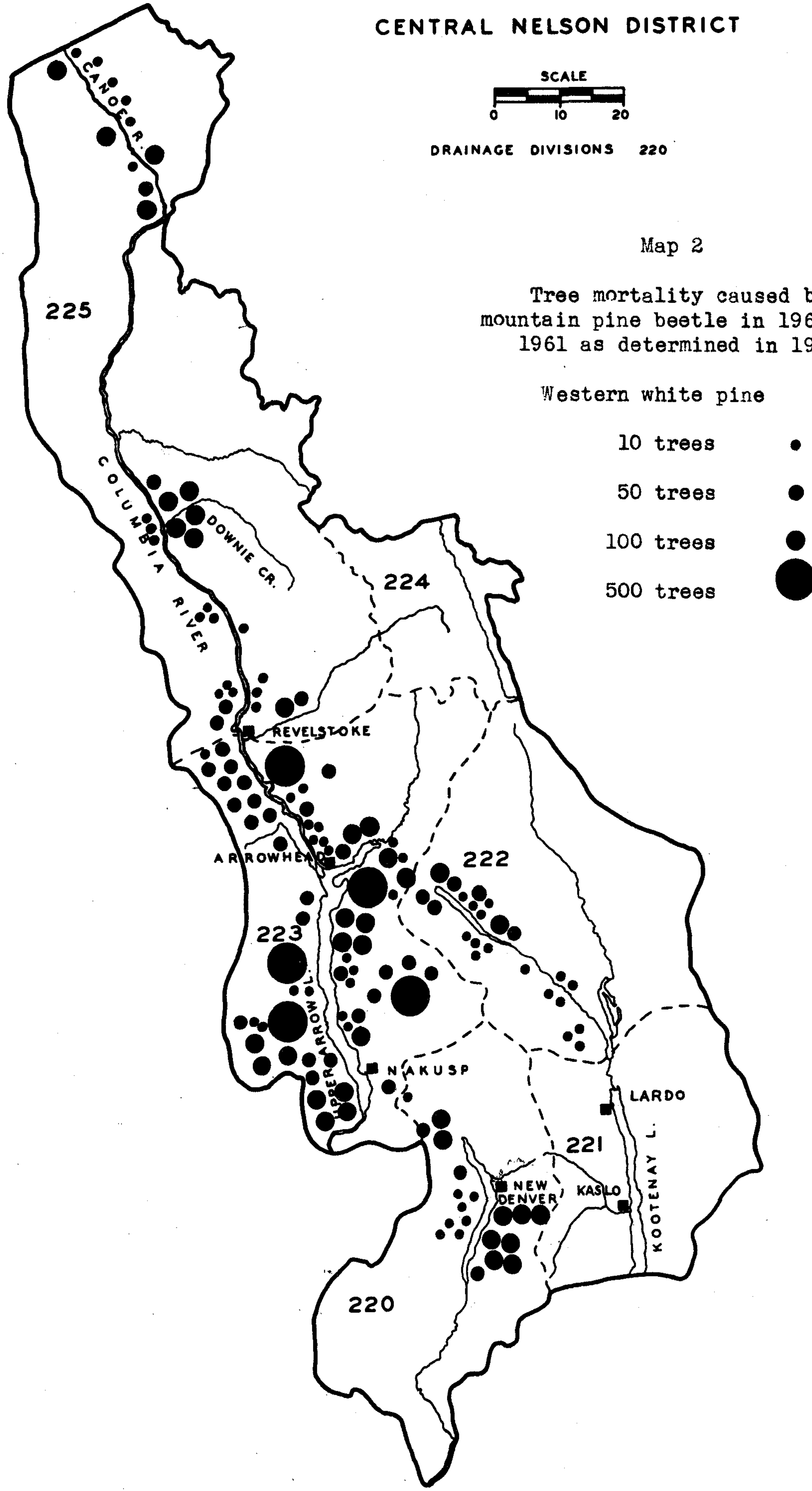
Host	Organism	Locality	Remarks
Western larch	*Arceuthobium campylopodum* f. *laricis* (Piper) Gill	Koch Creek	"Witches' brooms" numerous on saplings and mature trees
Western hemlock	*Fomes pini* (Fr.) Karst.	Alkolkolex River	a trunk rot; 21 sporophores counted on one tree of 20 inches d.b.h.
Western white pine	*Armillaria mellea* (Fr.) Kummer	throughout District	a root rot. Common on seedling trees.
Lodgepole pine	*Coleosporium asterum* (Diet.) Syd.	West Demars	needle disease
Populus X canadensis 'Robusta Bachelieri'	*Cytospora* sp.	Marblehead	a fungus causing die-back and canker. New host record.
Populus X canadensis 'Gelrica"	*Cytospora* sp.	Marblehead	as above

Host	Organism	Locality	Remarks
Populus petrowshyana	Cytospora sp.	Marblehead	as above
Populus X canadensis "Robusta Vernirubens'	Cytospora sp.	Mosquito Landing	as above
Populus 'Brooks'	Cytospora sp.	Mosquito Landing	as above



Map 1

Location of points where one or more collections were made and field records taken in 1962.



Map 2

Tree mortality caused by mountain pine beetle in 1960 and 1961 as determined in 1962.

FOREST INSECT AND DISEASE SURVEY

EAST NELSON DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

EAST NELSON DISTRICT

1962

N.J. Geistlinger

INTRODUCTION

Field work in the East Nelson District commenced on May 15 and continued until September 13.

Fifteen permanent sampling points were established, increasing the total number to 31.

Six hours of flying time were used in mountain pine beetle and forest tent caterpillar surveys in the Columbia Valley from Invermere to Cummins River, and in mountain pine beetle surveys in the White River and Wigwam River areas.

A total of 350 forest insect and 48 forest disease collections were taken in the District. Table 1 shows the collections by hosts and Map 1 shows locations where one or more collections were made or field records obtained in 1962.

Table 1

Collections by Hosts

East Nelson District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	9	-	Alder spp.	5	-
Douglas-fir	89	3	Ash, mountain	-	1
Fir, alpine	30	3	Aspen, trembling	20	30
Fir, grand	1	-	Birch spp.	11	-
Hemlock, western	21	-	Cottonwood, black	2	-
Juniper, common	2	2	Maple, Douglas	4	-
Juniper, Rocky Mountain	15	1	Willow spp.	1	2
Larch, western	16	1	Miscellaneous	6	-
Pine, lodgepole	45	2			
Pine, ponderosa	11	-			
Pine, western white	7	-			
Pine, whitebark	1	1			
Spruce, Engelmann	54	2	Total	49	33
Total	301	15	Grand total	350	48

STATUS OF FOREST INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Populations of mountain pine beetle as indicated by aerial surveys increased in all areas examined. The infestation at Bush River expanded considerably with an estimate of 500 red-top white pine, a 100 per cent increase over the 1961 count. The infested trees were in small groups scattered about a large central block where the attack was first noted.

At Redgrave 765 red-topped lodgepole pine were counted. These are in two groups of 500 and 65 on the east side of the Columbia River, and one group of 200 trees on the west side of the River. The number of lodgepole pine attacked in the Coyote Creek infestation increased to an estimated 500 red-tops. These trees were situated singly or in small groups over a large area. A count of 200 red-top white pine was made east of the White River and approximately five miles north of White Swan Lake. One hundred and fifty attacked lodgepole pine trees were also counted in this area.

Red-topped lodgepole pine trees were also noted at two other localities: Parson with 50 trees and the Wigwam River area with 100 trees. The trees in the Wigwam River Valley were in five groups, the largest of which contained 50 trees. Map 2 shows the locations and number of lodgepole pine and white pine trees killed by mountain pine beetle in 1960 and 1961.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Trees attacked by this beetle were noted at one locality in the East Nelson District, at the headwaters of Coal Creek where an infestation occurred in 1957. No evidence of fresh insect activity in living trees was observed in this vicinity. The beetle population was confined to high Engelmann spruce stumps which were cut during the winter of 1961-62 and to a few blow-down spruce trees.

On August 28 when the infestation was examined, 11 of 12 stumps which were fully peeled, harboured D. engelmanni, chiefly early instar larvae, some eggs, adults, and a few larvae about two-thirds grown. Most of the beetle galleries were in the north and west quadrants of the stumps and in the root collar region. Table 2 shows the total number of galleries in each quadrant and the average number per square foot.

From examination of Engelmann spruce stumps in three one-fifth acre plots, it was determined that the average number of stumps per acre was 50, and the average number of square feet of bark surface per stump was 27. It is calculated from the foregoing information that there would be 2700 beetle galleries per acre over approximately 60 acres.

Table 2

Engelmann Spruce Beetle Galleries in Twelve Spruce Stumps, Coal Creek, August 28, 1962

Quadrant	Total number of galleries	Av. no. of galleries per square foot
North	165	2.4
East	109	1.6
South	120	1.7
West	142	2.1
Average	134	2.0

The area around this infestation has either been logged or will be logged in the near future, therefore there is little likelihood of an infestation building up in this immediate vicinity. On the other hand, the beetle population in the stumps is large enough to pose a possible threat to merchantable Engelmann spruce stands in the Morrissey Basin, approximately four miles southwest of the Coal Creek infestation.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Populations of the Douglas-fir beetle remained at a low level throughout the District.

Twenty red-topped Douglas-fir trees were counted near the Wigwam River, 20 near Canal Flats, 10 west of Dutch Creek and 16 south of Grasmere, making a total of 66 trees killed by this beetle in 1961.

Many high stumps of Douglas-fir cut in the fall and winter of 1961-62, in the vicinity of Kinbasket Lake, were infested with beetles in the adult and egg stage when they were examined on June 7. A dense population was also found in decked Douglas-fir logs near Forster Creek on June 19.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The expected increase of severe defoliation by forest tent caterpillar of trembling aspen in the Columbia Valley in 1962 was confirmed during a damage appraisal flight over the area on June 27. A continuous belt of heavy defoliation extended from Brisco to Donald Station on both sides of the Columbia River, and areas of light defoliation were observed from Invermere to Brisco. Moderate defoliation was mapped in the Toby Creek and Horsethief Creek areas west of Invermere.

A new infestation was observed in the Kicking Horse Valley from Golden to the western boundary of Yoho National Park. Defoliation was moderate to heavy, in patches of two to five acres, on both sides of the Kicking Horse River. Map 3 shows the extent and severity of forest tent caterpillar infestations in the Columbia and Kicking Horse valleys.

Diseased Malacosoma disstria were very numerous at Donald Station and Nicholson. Many dead and dying larvae were also found in beating samples taken in the area between Nicholson and Donald Station.

Egg mass counts for predicting 1963 defoliation were made at seven localities. Both the standard three-tree sample and the sequential sampling method developed by R. F. Shepherd were used at each locality (Tables 3 and 4). The standard three-tree sample necessitates counting all the egg masses on each of three trees at each locality, while the sequential sampling method requires only the counting of egg masses on the outer 18 inches of two branches extending to the top of the canopy, exclusive of the terminal. In locations where the number of egg masses could not be categorized by the sequential sampling method after the felling of three trees, more had to be felled until the cumulative number of egg masses coincided with a category in the sequential sampling table. Results of the two methods concurred, except at Brisco where the sequential sample indicated light defoliation for 1963, but the three-tree sample pointed to heavy defoliation. Only in the Kicking Horse Valley was it necessary to fell more than five trees before the number of egg masses could be categorized using the sequential sampling method.

Egg masses at six of the seven sample points were generally small and had a poor protective coating. In the Kicking Horse Valley where the infestation was building up, the egg masses were much larger and had a good protective coat. This may be an indication of a healthy tent caterpillar population in this area for 1963.

Up to 50 cocoons were collected in each of four localities to determine percentage emergence, parasitism, and death from other causes. Scarcity of cocoons on understory growth at Nicholson and Brisco prevented larger collections being taken at these points. Parasitism was heaviest at Donald Station, and moth emergence was light. The largest percentage of moth emergence was at Brisco where parasitism was the lightest. (Table 5).

Table 3

Analysis of Forest Tent Caterpillar Egg Mass Collections from Three Trembling Aspen Trees at Each of Seven Localities, East Nelson District, 1962

Locality	Tree d.b.h. (in.)	Tree height (feet)	Crown length (feet)	Total no. 1962 egg masses	No. of eggs in five masses	Av. no. of eggs per mass	Predicted defoliation
Donald Stn.	5	48	27	5	854	171	light
	4	42	18	0			
	5	61	19	4			
Nicholson	6	48	15	3	559	112	light
	5	39	15	4			
	6	48	28	2			
Parson	7	60	15	14	410	82	light-moderate
	7	66	15	4			
	7	66	15	9			
Brisco	3	36	21	23	542	108	moderate-heavy
	4	42	24	20			
	4	39	24	16			
Horsethief Ranch Road	5	36	15	21	563	112	light-moderate
	5	42	18	3			
	6	42	21	5			
South Toby Creek	4	33	12	2	471	94	light
	4	38	12	8			
	6	48	21	0			
Kicking Horse Valley	5	36	15	51	917	181	heavy
	4	30	12	17			
	4	27	9	4			
		Average			617	123	

Table 4

Predicted Forest Tent Caterpillar Defoliation for 1963 Based on a Sequential Sampling Method, East Nelson District, 1962

Locality	No. of trees sampled	Av. tree d.b.h. (inches)	Av. tree height (feet)	Predicted defoliation severity
Donald Stn.	3	5	50	light
Nicholson	4	5	42	light
Parson	4	7	64	light
Brisco	5	4	42	light
Horsethief Ranch Road	5	5	39	light
South Toby Creek	4	4	32	light
Kicking Horse Valley	18	5	35	moderate

Table 5

Percentage Emergence and Mortality of Forest Tent Caterpillar Pupae at Four Localities, East Nelson District, 1962

Locality	No. of pupae examined	Percentage		
		emerged	parasitized	dead, other causes
Donald Stn.	50	36	56	8
Nicholson	25	48	28	24
Brisco	30	80	13	7
South Toby Creek	50	58	22	20

Douglas-fir Needle Midges, *Contarinia* spp.

Douglas-fir needle midges were again the cause of grave concern to the Christmas tree industry in one portion of the East Nelson District in 1962. As in 1961 the heaviest attack extended from Brisco to Fairmont, with a light attack in the Canal Flats area. Regeneration

Douglas-fir trees were most severely infested. On June 19 an examination was made of one Christmas tree cutting area near Invermere. This examination revealed approximately 40 to 60 per cent of the current year's needles infested with needle midge larvae. Douglas-fir needle miner adults were first observed ovipositing on newly opened Douglas-fir buds near Premier Lake on June 1.

Although there was a substantial increase in the number of Christmas trees cut in the Invermere Ranger District in 1962, Douglas-fir needle midges were still responsible in part for keeping the total cut well below that of 1960. At the present rate of increase, it is expected to take approximately three years before the annual cut is back to normal.

The total number and value of trees shipped from the Invermere Ranger District from 1960 to 1962 are shown below. The decreases are for the most part attributed to Douglas-fir needle midges.

	1960	1961	1962
Total number of trees shipped	495,425	232,674	298,619
Approximate value (dollars)	198,167	98,066	149,310

To determine the monetary value, an average of four trees per bale at $1.60 was used for 1960 and 1961, and four trees per bale at $2.00 for 1962. The ownership category, the number of trees cut and the percentage of total cut in the Invermere Ranger District from 1960 to 1962 are shown in Table 6.

Table 6

Christmas Trees Cut in the Invermere Ranger District, 1960-62

Land Ownership	1960		1961		1962	
	No. of trees	Percentage	No. of trees	Percentage	No. of trees	Percentage
Private Lands	66,619	13	47,083	21	60,582	20
Company Lands	271,295	55	95,562	41	130,101	44
Indian Reserve	47,462	10	30,424	25	24,912	8
Christmas Tree Permit Areas	107,062	22	59,605	13	83,024	28
Total	492,438	100	232,674	100	298,619	100

Aspen Leaf Miner, Phyllocnistis populiella Cham.

A decrease in population of the aspen leaf miner has been noted at the sample points in the southern portion of the East Nelson District. The average number of infested leaves at the four sample plots in 1961 was 64.6 per cent; in 1962 it was 43.6 per cent. (Table 7).

Mortality from parasitism and other causes increased in 1962, indicating another decrease in population in 1963 (Table 8).

Table 7

Percentage of Aspen Leaf Surfaces Mined, and Adult Aspen Leaf Miners Produced per Leaf Surface, East Nelson District

Locality	Percentage of leaf surface infested		Average no. of adults produced per leaf surface	
	1961	1962	1961	1962
St. Mary Lake	39	42	0.10	0.27
Moyie Lake	85	32	0.29	0.21
Findlay Creek	40	20	0.20	0.10
5 Mi. North of Dutch Creek	-	15	-	0.05
Average	64.6	43.6	0.19	0.15

Table 8

Mortality of Aspen Leaf Miner in Cocoons at Four Localities, East Nelson District, 1961 - 1962

Locality	Percentage mortality in cocoon stage			
	Parasitized		Other Causes	
	1961	1962	1961	1962
St. Mary Lake	11	25	7	9
Moyie Lake	6	13	6	9
Findlay Creek	6	18	4	20
5 Mi. North of Dutch Creek	-	19	-	27

A Leaf-tier, Pseudexentera improbana oregonana Wlshm.

Examination of trembling aspen leaves near Windermere Lake disclosed a continuing high percentage of rolled leaves. As in 1961, the ratio of inhabited leaves to the total number of leaves rolled was very low. Table 9 shows the percentage of aspen leaves rolled at six localities near Windermere Lake.

Table 9

Percentage of Trembling Aspen Leaves Rolled by a Leaf-tier, East Nelson District

Locality	1961	1962
2 Mi. N. of Dutch Creek	58	18
9 Mi. N. of Dutch Creek	5	10
12 Mi. N. of Dutch Creek	5	15
14 Mi. N. of Dutch Creek	5	8
2 Mi. N. of Fairmont	26	10
2 Mi. S. of Fairmont	39	41

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Examination of the Michel Creek plot revealed a severe attack in 1962. The terminals of 64 of the 100 trees examined were attacked in 1962; 37 of these trees had also been attacked previous to this year. Eleven trees had been attacked in 1961 or earlier. Twenty-five trees were uninfested.

A high percentage of the larvae were parasitized.

False Hemlock Looper, Nepytia canosaria Wlk.?

The number of false hemlock looper larvae collected in three drainage divisions of the East Nelson District decreased in 1962. Incidence of false hemlock looper larvae in quantitative Douglas-fir samples from June 8 to August 8 in 1960, 1961, and 1962, is shown below:

Drainage division	No. of samples taken during larval period			Percentage of samples containing larvae			Av. no. of larvae per positive sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
240	15	17	11	7	13	0	7	2	-
241	5	25	14	0	28	7	-	3	4
243	45	41	22	18	20	23	2	3	3

Green Spruce Looper, Semiothisa granitata Gn.

The percentage of collections containing green spruce looper larvae decreased in two drainage divisions of the District, while a marked increase was recorded in one division. There was an overall decrease in the average number of larvae per positive sample in all three drainage divisions for which information has been tabulated. The maximum number of larvae taken in a three-tree beating from Douglas-fir was 15, a decrease from 1961 when the maximum number in one collection was 63. Twelve samples from Engelmann spruce yielded an average of three larvae per sample and three collections from western hemlock produced an average of one larva. The occurrence of the green spruce looper in Douglas-fir samples in three drainage divisions in the East Nelson District in 1960, 1961 and 1962 is as follows:

Drainage division	No. of samples taken during larval period			Percentage of samples containing larvae			Av. no. of larvae per positive sample		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
240	7	21	11	19	76	55	4	12	6
241	5	25	20	80	84	65	5	11	5
243	38	33	17	45	70	100	2	7	7

Western Tent Caterpillar, Malacosoma pluviale Dyar

Tents made by this caterpillar were common on understory growth within the forest tent caterpillar infestation from Brisco to Donald Station, but the greatest number of colonies was observed in the McMurdo Bench area, east of the Columbia River. Numerous tents were noted on trembling aspen and willow in the Kicking Horse Valley east of Golden, again in association with the forest tent caterpillar. Larvae feeding on alder, willow, birch and mountain ash were common along the Big Bend Highway.

Fifty-four per cent of 50 antelope bushes, Purshia tridentata D.C., examined at Fort Steele Junction had one or more colonies of larvae feeding on them.

A Pitch Moth in Lodgepole Pine, Vespamima sequoiae (Hy.Edw.)

Forty-three per cent of lodgepole pine trees ranging in d.b.h. from four to 10 inches had been attacked by this insect over approximately three acres along the Perry Creek road. In many instances exudations of pitch completely encircled the root collar. Some infested lodgepole pine trees were also observed at Nicholson and along the Bugaboo Creek road.

A Leaf Blotch Miner, Lyonetia sp.

The severe infestation of this insect along the Big Bend Highway persisted in 1962. Approximately 90 per cent of the foliage of birch and willow, and about 60 per cent of the foliage of many alder clumps was infested. By June 28 the damaged leaves had changed color and the infested trees were easily distinguished from the air.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Nineteen larvae were collected from a three-tree sample off lodgepole pine on Freeman Creek near the International Boundary. Light defoliation was noticeable on one tree. Lodgepole pine samples from other points in the District produced a total of four larvae. Thirteen larvae were taken in 11 Douglas-fir collections, the maximum number per collection being three. Single larvae were taken in two alpine fir samples.

Mite Damage on Trembling Aspen

Spider mites caused no noticeable damage to aspen trees in the Windermere Lake area in 1962. Only a few eggs were seen on aspen leaves at Windermere in early June.

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

One collection from Douglas-fir on the Moyie River road contained 12 hemlock looper larvae. Four Douglas-fir samples from other points in the District produced an average of 1.2 larvae per sample. Collections containing up to five larvae were taken from western hemlock, alpine fir, western larch, Engelmann spruce and western red cedar.

Hemlock Sawfly, Neodiprion sp.

A significant increase in the number of hemlock sawfly larvae per positive sample was noted in 1962. In 1961 the average number of larvae per positive sample was 45; in 1962 it increased to 71. Noticeable defoliation of a few branches of western hemlock trees was observed along the Big Bend and Rogers Pass highways.

Green Striped Forest Looper, Melanolophia imitata Wlk.

Seventeen Douglas-fir samples containing an average of 2.4 larvae each were collected in the East Nelson District in 1962.

Black-headed Budworm, Acleris variana (Fern.)

Very few larvae were taken in quantitative samples from coniferous hosts in the District. The greatest number of larvae per collection was four, taken from alpine fir. Other hosts produced a maximum of two larvae per collection.

Spotless Fall Webworm, Hyphantria cunea Drury

A very light population on chokecherry was noted again in 1962. Two tents were observed at Elko and two near Bull River.

Spruce Gall Aphid, Adelges cooleyi (Gill.)

Many Engelmann spruce trees along the Big Bend Highway and Rogers Pass Highway were heavily infested by the spruce gall aphid. Galls were present on up to 65 per cent of the terminal branches of some trees.

An Ambrosia Beetle, Trypodendron lineatum (Oliv.)

A severe attack on Engelmann spruce stumps was found in a logged over area at Coal Creek. Heaviest attacks showed up to 355 holes per square foot.

Poplar Borer, Saperda calcarata Say

A small clump of trembling aspen trees ranging in diameter from two to eight inches was heavily infested near Windermere Lake in 1962. Most trees over four inches diameter had been top-killed.

A few aspen trees with an average d.b.h. of eight inches at Fort Steele were lightly attacked by this borer.

OTHER NOTEWORTHY INSECTS

Insect	Host	No. of collections	Remarks
Argyrotaenia occultana Freem.	F	4	Dutch Creek, Findlay Creek, White River.
Argyrotaenia tabulana Freem.	Pl	5	Inveremere and Elko areas
Caripeta divisata Wlk.	Se, F, Ba, H, Js, L	17	increase in number of collections; maximum number of larvae per sample was 7
Coleophora laricella Hbn.			not found in 1962

Insect	Host	No. of collections	Remarks
Dioryctria pseudotsugella Grt.	F	6	increase over 1961; all collected in Invermere area
D. reniculella Grt.	Se, F	6	increase in occurrence over 1961; maximum of 2 larvae per collection
Ectropis crepuscularia Schiff.	Se, F, Ba, H, C	16	greatest number taken from Douglas-fir and hemlock; maximum of 3 larvae per collection
Enypia griseata Blkmre.	F	4	decrease from 1961
Epirrita autumnata omissa Harr.	Se, F, Ba, H, Bi	12	small number of larvae per sample
Griselda radicana Wlshm.	Se, F, H	9	increase over 1961
Hypagyrtis piniata Pack.	F, H	9	small numbers throughout the District
Monochamus oregonensis Lec.	in flight	1	heavy flight of adults at a mill yard near Forster Creek on June 19
Nematocampa filamentaria Gn.	Se, F, Ba, H, C, L	20	increase in occurrence over 1961
Neodiprion sp.	F	13	population decreased in 1962
Panthea spp.	Se, F, Pl, Py, L	21	increase over 1961; greatest number of larvae taken from Douglas-fir
Parorgyia grisefacta Dyar	Se, F, H, L	11	found throughout District; maximum of 2 larvae per collection
Pero behrensarius Pack.	F	9	decrease from 1961
Pikonema alaskensis Roh.	Se	10	increase in positive collections over 1961; average of 2 larvae per sample
P. dimmockii Cress.	Se	22	common; average of 2.4 larvae per sample

Insect	Host	No. of collections	Femarks
Pristiphora erichsonii (Htg.)	L	1	two larvae found near Kingsgate
Protoboarmia porcelaria indicataria Wlk.	Se	1	very scarce
Semiothisa sexmaculata Pack.	L	8	increase in number of collections; average of 19 larvae per sample
Zeiraphera fortunana Kft.	Se, Ba	5	Coyote Creek, Toby Creek, Estella Mine Road
Zelleria haimbachi Busck	Se, Ba	5	Steamboat Mtn., St. Mary Lake, McNair Lake; maximum of 9 larvae per collection

STATUS OF FOREST DISEASES

Melampsora Rust of Trembling Aspen

A survey in connection with the discovery of a rust on yellow pine at Telkwa (see foreword) was conducted in the East Nelson District in 1962 to determine the occurrence of Melampsora albertensis Arth. on trembling aspen.

In May collections of overwintered aspen leaves from Wycliffe and Wasa showed moderate to heavy infection with telia of M. albertensis. Hard pines growing in the vicinity of aspen groves were examined for the presence of the aecial stage of the rust: no infection was found.

In mid-September an extensive survey was made of all portions of the District except the Big Bend Highway. Fifty leaves from each of three trees at 27 locations were examined for the presence of uredinia. Moderate to heavy infection was found at all sample points except at Elko where infection was lacking. Absence of uredinia at Elko may have been due to heavy infection of aspens by Marssonina sp.

It should be noted that trembling aspen in this region is also the alternate host of the larch rust Melampsora medusae Thüm. and the two rusts cannot be distinguished in their uredinial state on the host.

Douglas-fir Needle Blight

One area of moderate to heavy infection by Rhabdocline pseudotsugae Syd. was noted between Invermere and Wilmer in a stand of regeneration Douglas-fir. Infection in other parts of the District was extremely light.

A Dieback on Douglas-fir

Plots at Waldo, Premier Lake, Canal Flats and Invermere were examined in mid-August to record status of this disease. At the Premier Lake plot needles of most laterals on the lower crown of all trees were dry and the branches appeared to be dying. This however, may have been caused by drought. No new symptoms were found at the other plots.

Exotic Plantations

No damage by insects or disease was observed at any of the plantations in the East Nelson District. Browsing animals had caused severe damage at XP 169 containing Larix decidua, Upper Moyie River.

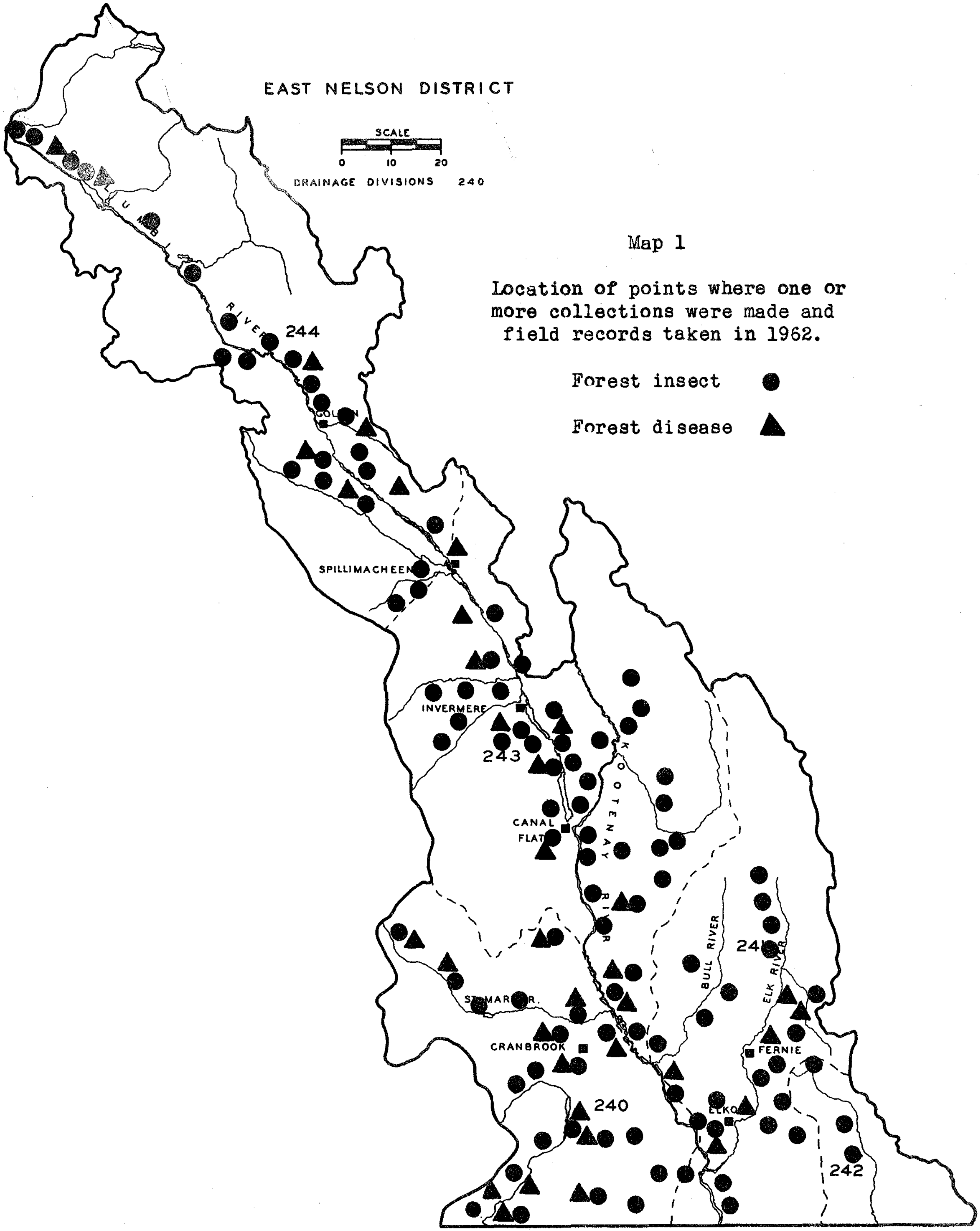
Porcupine Damage

Top-kill of 20 to 30 per cent of regeneration lodgepole pine trees in an area of about 50 acres near Michel Creek was caused by porcupines girdling the main stems.

OTHER NOTEWORTHY DISEASES

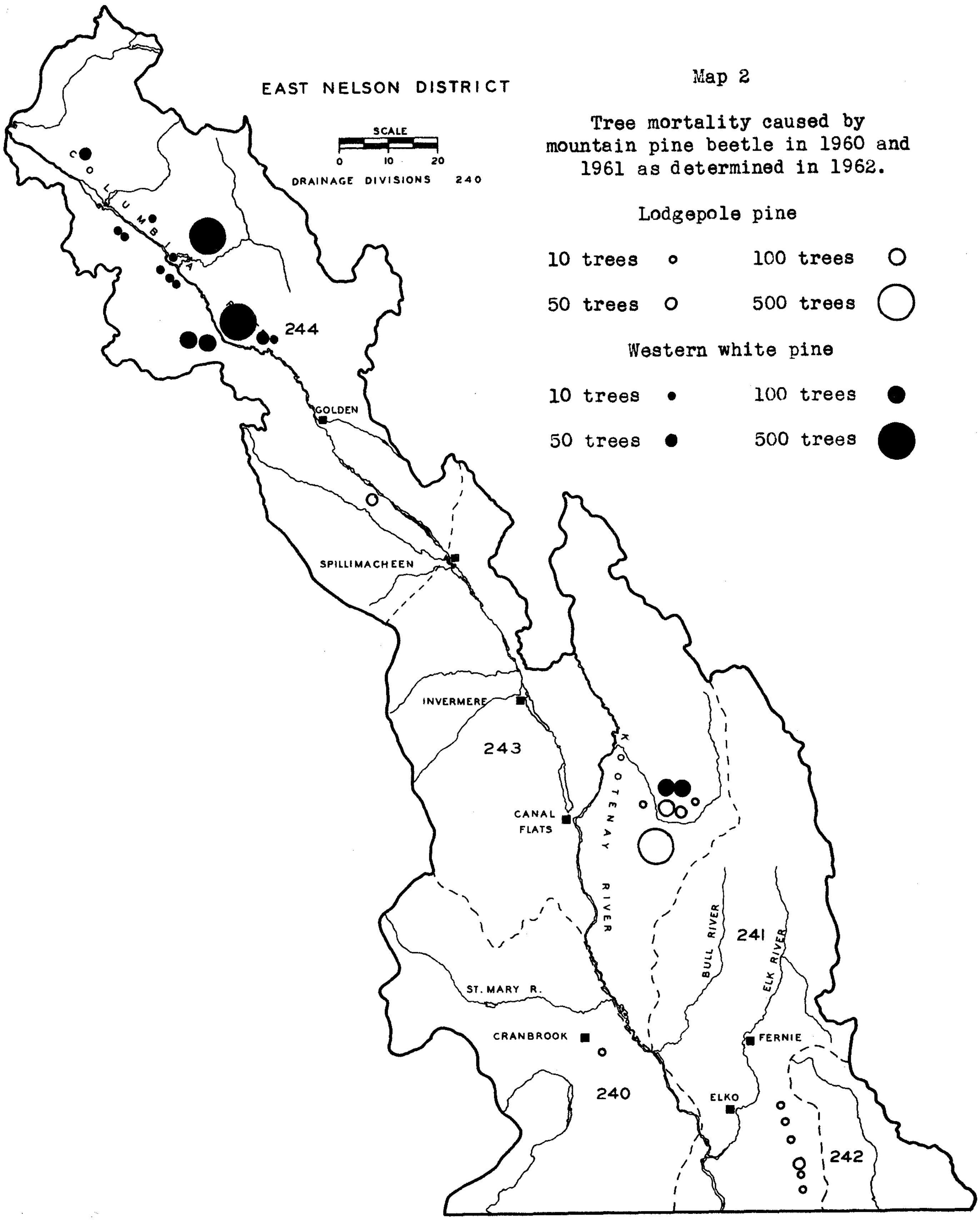
Host	Organism	Locality	Remarks
Alpine fir	Pucciniastrum epilobii Otth. sensu Hyl., Jørst. & Nannf.	White Creek	needle rust
Common juniper	Gymnosporangium clavariiforme (Pers.) DC.	Donald Station	telial and uredinal states common in mid-May.
Rocky Mountain juniper	Gymnosporangium nidus-avis Thaxt.	Windermere Lake	Common on Rocky Mtn. juniper in this area.
Western larch	Arceuthobium campylopodum Engelm. f. laricis (Piper) Gill	South of Moyie Lake	Common on mature trees.
Willow	Acrotheca sp.	Kinbasket L.	New record; associated with twig dieback.

Host	Organism	Locality	Remarks
Willow	<u>Melampsora</u> <u>epitea</u> Thüm.	Kimberley Airport	Common in the area: causes rust on alpine fir.



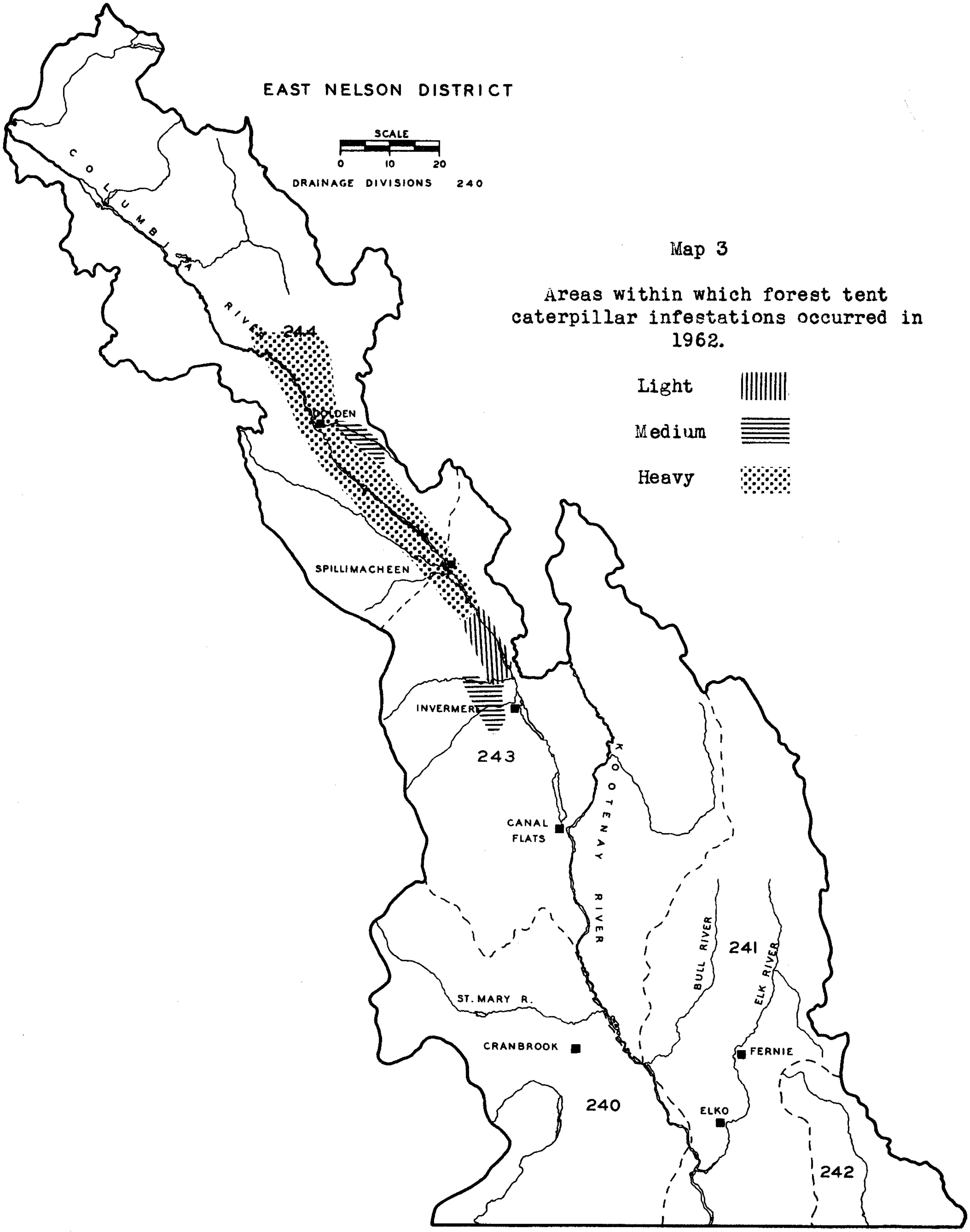
Map 1

Location of points where one or more collections were made and field records taken in 1962.



Map 2

Tree mortality caused by mountain pine beetle in 1960 and 1961 as determined in 1962.



Map 3

Areas within which forest tent caterpillar infestations occurred in 1962.

Light

Medium

Heavy

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1962

PRINCE GEORGE FOREST DISTRICT

FOREST INSECT AND DISEASE SURVEY

PRINCE GEORGE FOREST DISTRICT

1962

C. B. Cottrell

The four rangers assigned to the Forest Insect and Disease Survey in the Prince George Forest District were: J. C. Holms, Yukon; E. G. Pottinger, North Prince George; E. V. Morris, West Prince George and C. B. Cottrell, South Prince George.

In addition to ground surveys, 35 hours of flying time was made available for aerial surveys. Department of Forestry time was 17 hours and was used primarily to map spruce budworm defoliation. Time donated by the B. C. Forest Service and the Yukon Forestry Division totalled 18 hours and was used to count beetle-killed trees and to map areas of winter-injured trees.

The one-year-cycle spruce budworm caused heavy defoliation of white spruce in the Smith and Kledo river infestations. Moderate to heavy defoliation is expected to recur in 1963. Two-year-cycle spruce budworm feeding resulted in light to medium defoliation on 1,750 square miles of high elevation alpine fir and white spruce in the Rocky Mountain Trench. This is 400 square miles more than is reported in the Annual Report of the Forest Insect and Disease Survey, 1962, and is a result of a more detailed analysis of survey data. Defoliation of trees at low elevations in the West and South Prince George districts was light.

The Alaska spruce beetle has attacked white spruce at nine locations in the Fraser and Crooked River drainages. Most of the infested trees will be cut and removed from the woods in the winter of 1962-63. The number of lodgepole pine killed by the mountain pine beetle increased by several thousand trees in the Takla and Stuart lakes area. There were fewer beetle-killed Douglas-fir trees in 1962.

Approximately 30,000 acres of conifers, mainly lodgepole pine, were winter-injured in the Pine, Peace and Omenica river valleys. In northern British Columbia, three areas of damaged trees totalled 3,850 acres. Less than five per cent of the injured trees died.

Some 400 square miles of trembling aspen were defoliated by forest tent caterpillars in the Upper Fraser Valley from Goat River to Mount Robson. Medium to heavy defoliation is predicted in 1963. Near Taylor, 30 square miles of aspen were severely defoliated and heavy defoliation is expected next year.

Aspen leaf miner populations declined in all districts in 1962.

FOREST INSECT AND DISEASE SURVEY

SOUTH PRINCE GOERGE DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

SOUTH PRINCE GEORGE DISTRICT

1962

C. B. Cottrell

INTRODUCTION

The field work in the South Prince George District started on May 7 and continued until September 27, with the exception of one week in mid-August on the Douglas-fir bark beetle survey in the West Kamloops District. Several field trips were made in the South and West Prince George districts in November and December. Ten hours of flying time were available for aerial surveys of trees damaged by spruce budworm and bark beetles, of which four were provided by the B. C. Forest Service.

Throughout the field season 367 insect and 53 forest disease collections were made. Most of the forest disease collections were concerned with establishing the distribution and intensity of a rust of trembling aspen caused by *Melampsora albertensis* Arth. Table 1 shows the collections by hosts. Map 1 shows the location where one or more collections were made and field records taken in 1962.

Table 1

Collections by Hosts

South Prince George District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Douglas-fir	48	-	Alder, mountain	2	1
Fir, alpine	59	10	Aspen, trembling	54	40
Hemlock, western	12	-	Birch, scrub	3	-
Juniper, Rocky Mtn.	5	-	Birch, white	11	-
Pine, lodgepole	27	-	Cottonwood, black	2	-
Spruce, black	5	-	Miscellaneous	11	2
Spruce, white	128	-			
			Total	83	43
Total	284	10	Grand total	367	53

STATUS OF FOREST INSECTS

Two-year-cycle Spruce Budworm, Choristoneura fumiferana (Clem.)

The heaviest spruce budworm defoliation in 1962 occurred on white spruce and alpine fir in the Rocky Mountain Trench. The infestation extended from the mouth of the Torpy River north-west along the north side of the Fraser River, along the Torpy and McGregor river valleys and along Otter, Captain and James creeks, joining the West Prince George infestation at the headwaters of the Parsnip River. There was light defoliation in the valley bottoms and medium defoliation on the sub-alpine slopes. Approximately 625 square miles were defoliated. There was also light defoliation east of McBride, particularly near Horsey Creek.

There was only scattered light defoliation throughout the Willow and Cottonwood river drainages where medium to heavy defoliation was reported in 1960. The five permanent sample plots in the District were examined in late June to record the number of tips killed and the number of larvae per square foot of foliage (Table 2), and in mid-August to record defoliation and to make pupal and egg mass counts (Table 3).

The amount of defoliation, the number of larvae and the number of egg masses decreased in 1962 in all plots with the exception of Barkerville where a small increase was noted. The Barkerville plot is the only plot over 4,000 feet in elevation; the other plots are 3,000 feet in elevation or less.

During the larval feeding period 51 random white spruce collections were taken, of which 46 collections contained an average of seven larvae. Of 38 alpine fir collections taken, 30 contained an average of 20 larvae. The average number of larvae would have been much less had it not been for collections in sub-alpine regions, one of which contained 93 larvae.

A very large flight of moths was attracted to lights in the city of Quesnel on July 27.

Since the larval feeding period is short in the non-flight or odd-numbered years, the spruce budworm is not expected to cause serious damage in 1963.

Table 2

Mortality of Alpine Fir Tips Caused by Spruce Budworm and Number of Larvae per Square Foot of Foliage, South Prince George District, 1960 and 1962

Location	No. of tips examined		Percentage of tips killed		No. of larvae per sq. ft. of foliage	
	1960	1962	1960	1962	1960	1962
George Mountain	681	1097	26.4	13.4	5.8	2.5
Strathnaver	685	1466	42.7	8.4	5.1	0.9
Hay Lake	-	967	-	30.0	-	1.3
Genevieve Lake	741	1115	25.7	9.9	4.3	0.6
Barkerville	288	486	5.9	22.4	0	1.1

Table 3

Average Estimated Defoliation, Number and Condition of Pupae, and Number of Egg Masses per Square Foot of Foliage, Spruce Budworm, South Prince George District, 1960 and 1962

Location	Av. est. defoliation				Pupae				Av. no. of masses per sq. ft.	
	Current		Total		No. adults emerged		No. dead			
	'60	'62	'60	'62	'60	'62	'60	'62	'60	'62
George Mountain	80	10	-	20	8	11	3	4	1.53	0.52
Strathnaver	80	10	-	40	18	7	4	0	0.73	0.06
Hay Lake	-	10	-	35	-	7	-	1	-	0.18
Genevieve Lake	60	10	-	20	54	9	1	0	2.63	0.36
Barkerville	0	5	-	10	0	1	0	0	0	0

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

There was an increase in the number of standing white spruce trees attacked by the spruce beetle in 1962. Six small scattered infestations were reported in the District. Near Hush Lake, north-east of Quesnel, approximately 100 mature spruce were heavily infested in an area surrounded by wind-felled trees. Late in the year the B. C. Forest Service reported another infestation 15 miles east of Quesnel.

An estimated 200 immature spruce that had been lightly burned in the 1961 "Grove" fire were lightly attacked. Further south in the Willow River Valley, near George Creek, five mature trees were heavily infested. A few fire-damaged trees were attacked near Fly Creek in the 1961 "Tsus" fire. Infested trees were also reported north-west of Hansard Lake in an area that is currently being logged. Several thousand decked spruce logs in the Torpy Valley were heavily infested but no standing attacked trees were found.

A one-year-cycle spruce beetle population is believed to exist at the lower elevation infestations such as Willow River (Grove fire) and Hansard, 2,000 feet and Hush Lake, 2,500 feet. At Hush Lake heavily infested trees, containing more teneral adults than larvae, still retained a full complement of green foliage in December.

The recent increase of the spruce beetle populatinn appears to be related to fire-damaged trees in two infestations, blowdown in two and possibly logging slash in the other two. Woodpeckers have attacked beetles in many of the trees but would not appear to be able to completely control the infestations. Infested trees in most infestations will be logged during the winter of 1962-63, therefore beetle populations may be held to a minimum.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The 1962 Douglas-fir beetle attack does not appear to have been heavy in standing trees. In the Narcosli Creek Valley, approximately five per cent of the mature Douglas-fir trees left in logged areas as seed trees were attacked, although most logging slash was thoroughly infested. In 1961, an estimated 10 per cent of the seed trees were beetle-killed. Most of the attacked trees were mechanically injured prior to being attacked.

On July 10, 1962, an aerial survey of red-foliaged Douglas-fir trees was made in the District. Fourteen hundred and twenty-one trees were assumed to have died in the three-year period from 1959 to 1961 as shown in Table 4. It was noted from the air that beetles had attacked groups of up to 100 trees in the unlogged areas bordering logging operations rather than occasional trees left within the logged areas.

Table 4

Douglas-fir Trees Killed by the Douglas-fir Beetle in the Period 1959 to 1961 as Determined in 1962, South Prince George District

Location	No. of dead trees	Av. volume per tree (cu. ft.)	Estimated volume of timber (cu. ft.)
Saunders	387	80	50,960
Lazaroff Lake	54	100	5,400
Ruric Creek	104	75	7,800
Narcosli Creek	517	80	41,360
Australian	83	75	6,225
Alexandria	60	75	4,500
Marguerite	216	75	16,200
Total	1,421		112,445

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Mountain pine beetle infestations remained at a low level in 1962. Three spot infestations near Lazaroff Lake totalled 85 lodgepole pine trees killed. Ten lodgepole pine were attacked near Tabor Lake.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

An estimated 4,400 mature alpine fir trees killed by the western balsam bark beetle were observed during an aerial survey on July 25. The beetle-killed trees, bearing red foliage, were assumed to have died in the five-year period 1957 to 1961. Table 5 shows the location and estimated number of beetle-killed alpine fir.

Table 5

Estimated Number of Alpine Fir Killed by the Western Balsam Bark Beetle in the Period 1957 to 1961 as determined in 1962, South Prince George District

General area	Location	Beetle-killed alpine fir	Est. volume (cu. ft.)
Upper Fraser River	Tabor Lake	125	2,500
	Aleza Lake	50	1,000
	Morkill River	700	14,000
	Dore River	300	6,000
	Holmes River	200	4,000
	Moose Lake	300	6,000
McGregor River	Otter Creek	50	1,000
	James Creek	125	2,500
Bowron River	Wendle Creek	150	3,000
	Haggen Creek	1,500	30,000
Willow River	George Creek	500	10,000
	Narrow Lake	400	8,000
Total		4,400	88,000

An Ambrosia Beetle, Trypodendron sp., prob. lineatum (Oliv.)

In June, ambrosia beetles were frequently found in white spruce logs in the northern part of the South Prince George District (Table 6). The highest population was at Eaglet Lake where approximately 500,000 cubic feet of spruce contained an estimated 15 attacks per square foot. These logs, cut in November and December of 1961, were bundled in groups of 50 and stored in the lake. Logs above water, approximately half of each bundle, were heavily attacked. Another 500,000 cubic feet of logs, cut in January and February of 1962, and stored in the lake singly, were not attacked. It is generally believed that logs cut in November and December are more susceptible to ambrosia beetle attack than those cut in January and February.

Table 6

Estimated Volume of White Spruce Timber Attacked by Ambrosia Beetle, South Prince George District, 1962

Location	Vol. of timber attacked (cu. ft.)	Est. no. of attacks per sq. ft.
Tabor Lake	40,000	2
Shelley	75,000	3
Willow River	10,000	0
Eaglet Lake	500,000	15
Aleza Lake	25,000	10
Wanda Lake	150,000	8
Pitoney Lake	75,000	8
Hixon	300,000	1
Quesnel	500,000	1
Kersley	75,000	0

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The tent caterpillar infestation on trembling aspen in the Upper Fraser Valley increased in size in 1962. In 1961, the infestation was approximately 60 miles long extending from McBride to slightly east of Tete Jaune. The 1962 infestation, 100 miles long, started at Goat River and extended to Mount Robson at varying widths of from two to six miles. The aspen stands from Tete Jaune south to Valemount and the Canoe River bottom, 2,300 feet in elevation, to between 4,200 and 4,500 feet on the sidehills and in a few localities went as high as 5,000 feet.

Tent caterpillar egg masses were collected from three aspen trees in each of seven plots in late September. Trees in the centre and at the periphery of the infestation contained from 15 to 133 egg masses per tree. The largest number of egg masses was found at Dunster where the infestation was first reported in 1956. These trees have been severely defoliated for the past seven years. Until 1961, the number of egg masses had been decreasing annually at Dunster, the centre of the infestation, and increasing at the periphery. The 1962 increase of egg masses may be due to strong winds affecting the moth flights during the egg-laying period.

On the basis that larvae from 10 or more egg masses are sufficient to cause heavy defoliation to a five inch d.b.h. aspen, defoliation in 1963 may be expected to be heavy especially in the vicinity of McBride, Dunster and Valemount (Table 7). However, many egg masses were small containing few eggs and many had poor protective coatings. Therefore, although egg masses are numerous and some heavy defoliation may be expected in 1963, it appears the infestation is starting to decline.

No egg masses were found at three old plots between Prince George and Quesnel in 1962. The plots, at Woodpecker, Yardley Lake and Dragon Lake were established during the 1951-54 infestation.

Table 7

Forest Tent Caterpillar Egg Masses, Upper Fraser Valley Infestation, South Prince George District, 1961 and 1962

Location	Location of plots, re: 1962 infestation	Av. no egg masses per tree		Av. no. eggs per mass		Percentage of 1962 eggs with good protective coating
		'61	'62	'61	'62	
Lamming Mills	adjacent	0	7	-	102	47
McBride	perimeter	87	86	128	94	80
Dunster	centre	89	133	112	90	93
Carrs	centre	147	15	141	99	45
Rearguard	perimeter	-	37	-	79	45
Valemount	perimeter	218	65	138	99	73
Mt. Robson	adjacent	0	1	-	177	100

Western Tent Caterpillar, Malacosoma pluviale var.?

Ten acres of scrub birch, Betula glandulosa Michx., were severely defoliated at Aleza Lake. When pupation was completed on July 16, 100 cocoons were examined; 42 contained living pupae, 38 were parasitized and 20 were diseased or otherwise dead.

Larvae were also numerous on scrub birch in a five-acre swamp at Newlands. A half chain by three chain plot was established to record the annual population changes. On June 8, 47 tents were counted.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Aspen leaf miners continued to attack the leaves of trembling aspen trees throughout the South Prince George District although with less intensity than in 1961. The infestation was heavy from Quesnel to Hixon and moderate from Hixon to Prince George and east along the Fraser River to its headwaters. South of Quesnel, where aspen often forms open-growing groves, the infestation was light. Table 8 shows the percentage of leaf surfaces with mines and the number of adults produced per leaf surface in five plots established in 1960 plus two plots south of Quesnel established in 1962. Although parasitism was less in four of the five plots established in 1960, mortality from other causes was higher in most plots (Table 9).

Table 8

Aspen Leaf Surfaces Mined and Number of Adults Produced per Leaf Surface, South Prince George District, 1961 and 1962

Location	Percentage of leaf surfaces with mines		No. adults produced per leaf surface	
	1961	1962	1961	1962
Prince George	92	34	.77	.10
Cale Creek	64	47	.06	.10
Stone Creek	94	34	.04	.08
Woodpecker	81	78	.11	.28
Hixon	93	69	.10	.08
Kersley	-	12	-	.03
Narcosli	-	4	-	.02

Table 9

Mortality of Aspen Leaf Miner in 100-cocoon Samples, South Prince George District, 1961 and 1962

Location	Percentage mortality			
	Parasitism		Other causes	
	1961	1962	1961	1962
Prince George	12	23	6	12
Cale Creek	67	29	20	13
Stone Creek	79	18	13	31
Woodpecker	76	23	8	31
Hixon	71	24	12	54
Kersley	-	16	-	14
Narcosli	-	13	-	3

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Western hemlock looper populations remained at a low level in 1962. Other than two white spruce collections near Hansard that contained 11 and eight larvae, only three larvae were collected in the District.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm population continued at a low level. Of 48 white spruce collections taken during the larval feeding period, three collections contained a total of four larvae. No larvae were collected from Douglas-fir, western hemlock or alpine fir.

Saddle-back Looper, <u>Ectropis crepuscularia</u> Schiff.

Saddle-backed loopers were scarce in white spruce, alpine fir, western hemlock and Douglas-fir collections throughout the District.

Green Velvet Looper, <u>Epirrita autumnata</u> Harr.

Since 1960 there has been an increase in the number of green velvet loopers in alpine fir and white spruce collections in the South Prince George District, notably in the Naver Provincial Forest. Although larvae were not present in sufficient numbers in 1962 to cause serious defoliation, the increase was notable in that it came at the time when spruce budworm populations were decreasing. In 1955 when spruce budworm populations had declined after several years at infestation levels, the green velvet looper populations increased and caused heavy defoliation of alpine fir and white spruce trees that had suffered from previous spruce budworm defoliation.

Occasional larvae were also collected in 1962 from black spruce, western hemlock, western white birch and trembling aspen. The following table shows the percentage of collections containing green velvet loopers and the average number of larvae per positive alpine fir and white spruce collection in 1960 and 1962.

Host	No. collections taken during larval period			Percentage collections containing larvae			Av. no. larvae per positive collection		
	1960	1961	1962	1960	1961	1962	1960	1961	1962
alpine fir	27	22	40	7	50	50	1.5	1.8	2.3
white spruce	34	20	44	3	2	9	1.0	1.0	2.2

Green Striped Forest Looper, <u>Melanolophia imitata</u> Wlk.

Of 22 Douglas-fir collections made in June and July south of Quesnel, two contained a total of three larvae.

Oregon Fir Sawyer, <u>Monochamus oregonensis</u> Lec.

Sawyer beetles were collected from many widely scattered points in the District in 1962, from June 21 to September 26. Since beetles were readily found on September 26, it seems likely that their flight period extended later into the year. Copulation and egg laying was observed throughout the season, however populations appeared light after the end of July. Numerous logs from two August 1961 fires, the "Grove" and

"Tsus", were examined in June 1962. A negligible number of logs was attacked.

In 1962, a moderate population attacked white spruce and alpine fir logs along the Upper Fraser Valley from Aleza Lake to Sinclair Mills and a light population from Goat River to Moose Lake. Douglas-fir and lodgepole pine were lightly attacked in the vicinity of Quesnel.

Poplar Borer, Saperda calcarata Say

Nine groups of trembling aspen infested with the poplar borer were found in the South Prince George District, eight in the vicinity of Quesnel and one near Hixon. Eight of the groups, varying from five to 10 trees, were lightly infested. At Buck Ridge 60 aspens were severely attacked.

Twenty, three-foot infested log sections were taken from the above infestations and caged at Prince George to establish adult emergence dates. One adult emerged on July 18, 1962, from a log section cut at Hixon on June 11, 1962. All other beetles remained in the larval stage.

An Engraver Beetle, Ips engelmanni Sw.

Most log decks and slash in the Upper Fraser Valley region were heavily infested by engraver beetles but no standing attacked trees were found.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Although larvae were numerous at several locations such as Wansa Lake, Aleza Lake and Hixon, pupae and adults were extremely scarce due to parasitism. Near Wansa Lake 21 of 179 immature white spruce were attacked in a one-half by 10 chain plot. Approximately 10 per cent of the regeneration spruce on a 40 acre plot at Aleza Lake had been attacked during the past several years. At Reservoir Lake, east of Hixon, an estimated five per cent of the leaders of immature white spruce were infested.

A Sawfly on Douglas-fir, Neodiprion sp.

There was a decrease in the average number of Neodiprion sp. larvae on Douglas-fir in the Quesnel area. In 1962, 30 collections yielded an average of 1.3 larvae compared with an average of 5.8 for 21 collections in 1961.

A Geometrid, Hydriomena renunciata Wlk.

Between 10 and 25 per cent of the leaves of most mountain alders in the vicinity of McBride were skeletonized and rolled by this geometrid, usually accompanied by the geometrid Rheumaptera hastata (Linn). These attacks have continued for several years with no apparent permanent damage to the alders.

A Leaf-miner, Lyonetia sp.

Heavy discoloration of western white birch foliage was visible from the air in the Upper Fraser Valley from McBride to Moose Lake and in the upper Canoe River Valley. White birch constitutes approximately 10 per cent of the stands in the Upper Fraser Valley which covers some 400 square miles. Leaf-miner attacks were heaviest in tributary valleys such as the Holmes and Raush rivers and Kiwa and Swiftcurrent creeks.

A Spruce Gall Midge, Rhabdophaga swainei (Felt)

Small numbers of white spruce buds were killed in early spring by the spruce gall midge, notably in the vicinity of Woodpecker and Wells.

Douglas-fir Needle Miners, Contarinia spp.

The distribution of Douglas-fir needle miner attacks was widespread throughout the range of Douglas-fir in the District, although in greatly varying degrees of intensity. In the Upper Fraser Valley, the percentage of infested needles was: one at Tete Jaune; 67 at Mount Robson and 93 at Red Pass. Here the heavier infestations were at higher elevations; collections were made near 2,400 feet at Tete Jaune, 3,200 at Mount Robson station and 3,700 feet near Red Pass. In the vicinity of Quesnel, the percentage of infested needles was: one at Lazaroff Lake; 10 at Red Rock and 50 at Alexandria.

Spruce Gall Aphid, Adelges cooleyi Gill.

With few exceptions, white spruce throughout the District were lightly attacked by the spruce gall aphid. An estimate of the intensity of attack was made by examining 100 tips from three trees used in standard random beating collections. The percentage of infested tips ranged from zero to 10 from Macalister to Prince George, except at Lazaroff Lake where two samples had 28 and 41 per cent of the tips infested. From Prince George to Yellowhead the percentage of attack was zero to 15 with the exception of one sample at Giscome where 48 per cent of the tips were infested.

Spruce Seedworm, Laspeyresia youngana Kft.

White spruce cones infested by spruce seedworms were common in small numbers in most spruce stands. Fifty cones were examined at each of five locations in the District (see Table 10). Cone crops were generally light to medium.

Table 10

Percentage of White Spruce Cones Infested by the Spruce Seedworm, South Prince George District, 1962

Location	Percentage cones infested
McBride	12
Tete Jaune	0
Aleza Lake	18
Quesnel	12
Kersley	56

Douglas-fir Cone Moth, Barbara colfaxiana Kearf.

Douglas-fir cones in scattered locations were lightly attacked by Douglas-fir cone moths. At sample points south of Quesnel, 18 of 50 cones were infested at Alexandria and four of 50 cones at Macalister were attacked. None of the 50 cones examined at Tete Jaune was attacked . Cone crops were medium in 1962.

A Cecidomyiid on Lodgepole Pine

South of Dragon, the terminal growth of immature lodgepole pine was hollowed out and distorted by a cecidomyiid larva. About five per cent of the new growth in a five acre plot was infested.

OTHER NOTEWORTHY INSECTS

Insect	Host	No. of collections	Remarks
Caripeta divisata Wlk.	Ba, F, H, Sw	22	Average 3 larvae, increase
Clepsis persicana Fitch	Ba, Pl, Sw	3	decrease
Neodiprion spp.	F, Sw	17	Average 3 larvae, decrease
Nyctobia limitaria Wlk.	Ba	1	decrease
Operophtera bruceata Hlst.	Ba, Sw	3	scarce

Insect	Host	No. of collections	Remarks
Pamphiliidae	Pl, Sw	5	Uncommon
Pikonema alaskensis Roh.	Sw	18	Average 2.6 larvae,
Pikonema dimmockii Cress.	Sw	18	Average 2.3 larvae, increase
Semithosia granitata Gn.	Ba, F, H, Sw	22	Average 2 larvae, increase
Syngrapha spp.	Ba, Pl, Sw	13	Average 1.4 larvae, increase
Zeiraphera fortunana Kft.	Sw	1	Uncommon

STATUS OF FOREST DISEASES

Important Diseases

A Leaf Spot of Trembling Aspen

In June, brown spots caused by Marssonina sp. appeared on the leaves of many trembling aspen trees between Prince George and Quesnel. The leaves of attacked aspens had appeared two to three weeks later in the spring and were smaller than the leaves of unattacked trees. By mid-July the injured leaves had turned bronze in colour and began to shrivel.

Between Prince George and Cinema, where aspen is a major species, groups of from 100 to 1000 trees were affected. Between Cinema and Quesnel, where aspen is a minor species, 98 groups averaging 20 trees per group were counted in 25 miles along the Cariboo Highway.

Melampsora Rust of Trembling Aspen

During August and September, trembling aspen leaves were examined at 10-mile intervals throughout the District to establish the distribution and intensity of Melampsora albertensis Arth. The only heavy infections occurred in the Upper Fraser Valley where from 24 to 96 per cent of the leaves examined were infected. From Sinclair Mills to Prince George the percentage of infected leaves varied from zero to 40. Between Prince George and Macalister infection varied from zero to 26 per cent and averaged nine per cent in 21 samples. The importance of the rust and its relationship to one of the alternate hosts, ponderosa pine is covered in the Foreword.

EXOTIC PLANTATIONS

No infectious diseases were found on any of the exotic plantations. Ten mugho pines on the Prince George Experimental Station were severely "burned" by a wind-borne chemical spray. Also on the Experimental Station, two scots pine cones were infested by larvae of a cone moth, Dioryctria sp.

Table 11

Summary of Exotic Plantations, South Prince George District, 1962

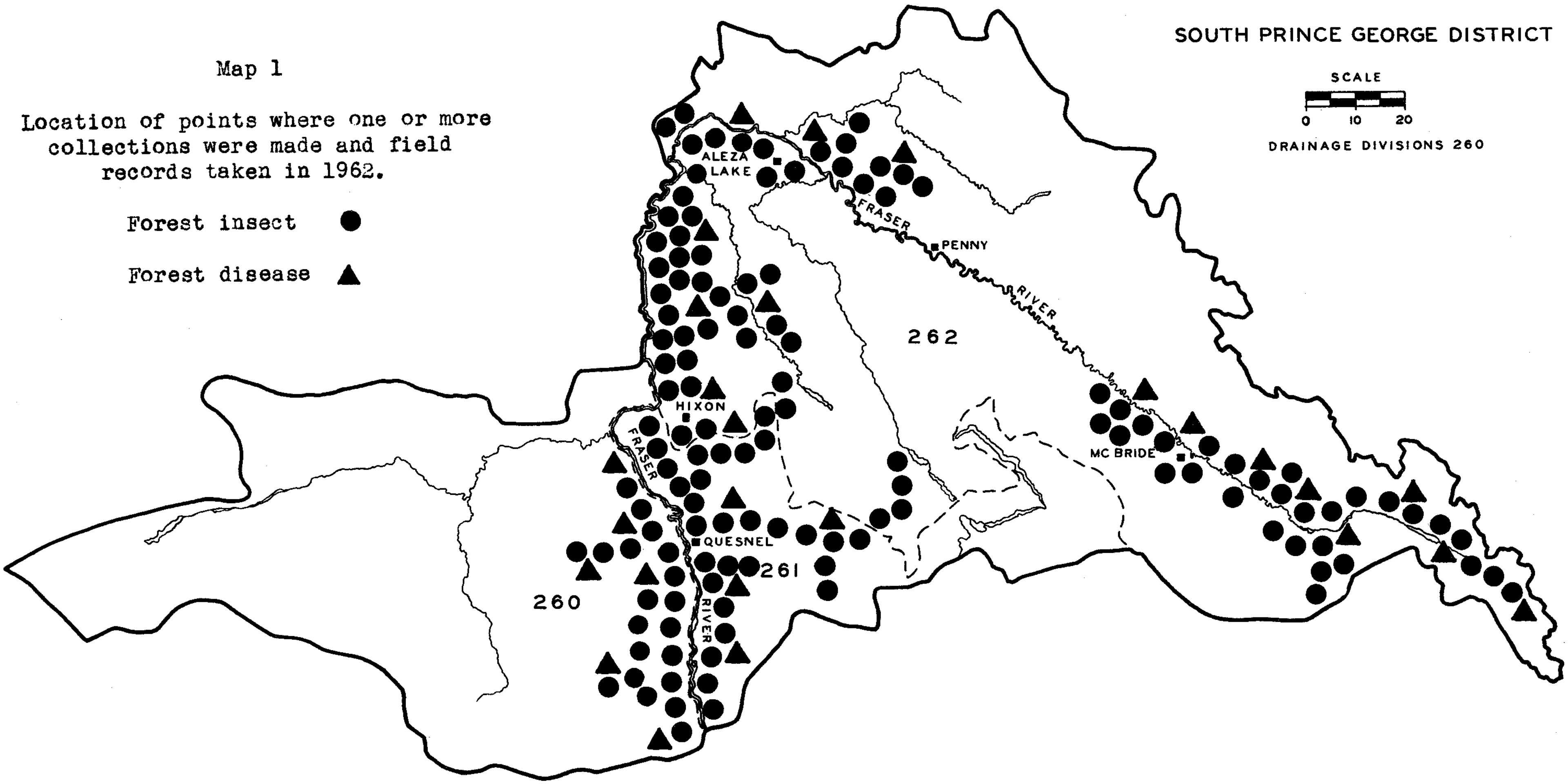
Plant no.	Location	Tree species	Remarks
XP-50	Aleza Lake Exp. Sta.	Scots pine	trees healthy
XP-69	Fraser R. (Cottonwood Canyon)	Scots pine	trees healthy
XP-70	Fraser R. (Cottonwood Canyon)	Norway spruce	trees healthy, good growth
XP-71	Fraser R. (Cottonwood Canyon)	Engelmann spruce	trees healthy
XP-72	Fraser R. (Cottonwood Canyon)	Colorado spruce	trees healthy
XP-117	Prince George (Exp. Sta.)	mixed conifers	10 mugho pine injured by chemical spray
XP-118	Prince George (Exp. Sta.)	mixed hardwoods	trees healthy
XP-135	Giscome	silver maple	trees browsed

Map 1

Location of points where one or more collections were made and field records taken in 1962.

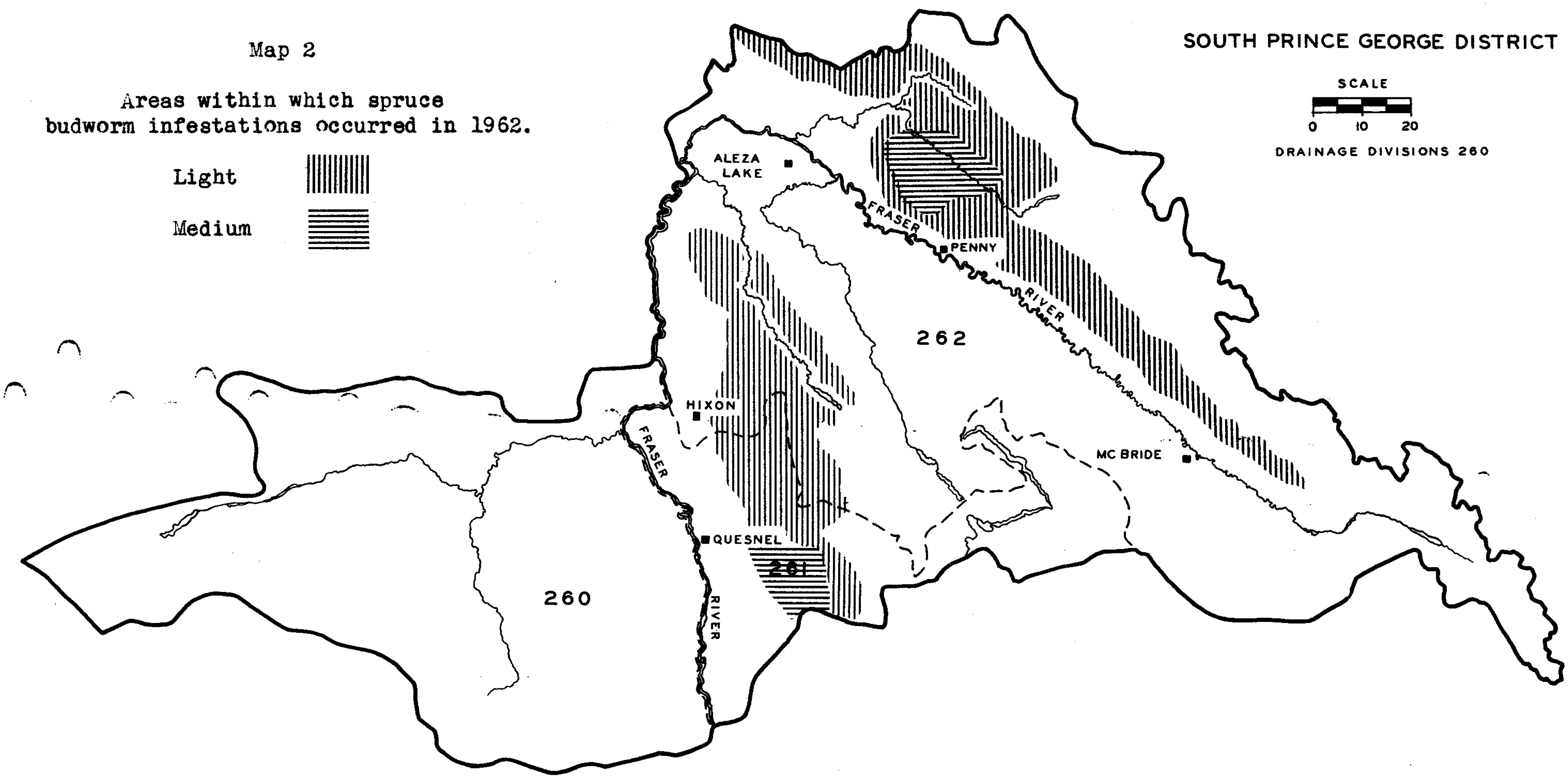
Forest insect ●

Forest disease ▲



Map 2

Areas within which spruce budworm infestations occurred in 1962.



FOREST INSECT AND DISEASE SURVEY

WEST PRINCE GEORGE DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

WEST PRINCE GEORGE DISTRICT

1962

E. V. Morris

INTRODUCTION

The field season commenced in the West Prince George District on May 2 and continued to September 21. A total of 40 permanent sample stations was established in the District up to the end of the 1962 field season. A total of 360 forest insect and 45 forest disease collections was made throughout the District by Forest Entomology and British Columbia Forest Service personnel during the field season. Twelve hours flying time was spent surveying and mapping the two-year-cycle spruce budworm infestation and counting bark beetle killed trees.

One week in August was spent in the West Kamloops District and two weeks in November and December were spent in the Prince George Forest District on bark beetle cruises.

Table 1 shows the forest insect and forest disease collections by host. Map 1 shows the distribution of the collections and field records taken.

Table 1

Collections by Hosts

West Prince George District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Douglas-fir	35	0	Alder spp.	4	0
Fir, alpine	58	2	Aspen, trembling	36	40
Pine, lodgepole	65	2	Birch spp.	7	0
Spruce, black	6	0	Cottonwood, black	8	0
Spruce, white	110	1	Willow spp.	3	0
Larch, eastern	5	0	Miscellaneous	17	0
Juniper, common	6	0			
			Total	75	40
Total	285	5	Grand total	360	45

STATUS OF INSECTS

Two-year-cycle Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The spruce budworm infestation in the West Prince George District declined in all areas where defoliation on alpine fir and white spruce was reported in 1960, except at Pine Pass. An aerial survey of the infestation was done in conjunction with the South Prince George and East Prince Rupert aerial surveys. A total of 12 hours flying time was spent in the West Prince George District. The only areas where medium and light defoliation was evident was along the Rocky Mountain Trench from the headwaters of the Parsnip River to the Misinchinka River thence along the Misinchinka River to Pine Pass. Smaller patches were also found on the western slopes of the Trench from the Nation River to Merton Lake. All defoliation was light except for occasional small areas of moderate defoliation. The approximate total area of spruce budworm infestations in this area was 1,125 square miles. Map 3 shows the areas in which light and medium defoliation occurred.

Ground checks in the Nation Lakes district where defoliation occurred in 1960 indicated that the infestation had collapsed; no feeding was observed on the understory or overstory alpine fir and white spruce.

The four budworm plots established in 1956 were sampled in June for larval populations and in August for bud damage, defoliation estimates, and pupal and egg mass counts. One sample branch 18 inches long was taken from the mid-crown of each of 10 alpine fir trees at each plot, and the percentage of tips killed and the number of larvae and pupae present was recorded. Results of this work are contained in tables 2 and 3.

Table 2

Examination of Ten 18-inch Alpine Fir Branch Samples per Plot, West Prince George District 1960 and 1962

Locality	No. of tips examined		Percentage of tips killed	
	1960	1962	1960	1962
Davie Lake	571	724	11	2
Tudyah Lake	782	1062	24	17
Pine Pass	777	854	35	45
Big Creek	655	630	62	18

Table 3

Number of Spruce Budworm Larvae per Square Foot of Alpine Fir Foliage Based on Ten 18-inch Branch Samples per Plot West Prince George District, 1956, 1958, 1960 and 1962

Locality	Number larvae per square foot of foliage			
	1956	1958	1960	1962
Davie Lake	1.06	0.84	0.63	0.38
Tudyah Lake	3.42	2.46	1.66	1.20
Pine Pass	1.73	0.96	5.09	10.60
Big Creek	5.67	0	1.72	1.05

The larval population at Pine Pass more than doubled compared with the 1960 level. A decline was recorded in the remaining plots. At Davie Lake, Tudyah Lake and Big Creek the larval populations were respectively 40, 28 and 39 per cent lower than in 1960.

In the latter part of August and early September the sample plots were examined to obtain data on defoliation, number of pupae, emerged and parasitized, and number of egg masses. The same sampling method was used to obtain these data as was used in the larval counts taken in June. The egg counts made at the plots indicate a further decline of the spruce budworm larval population in 1963. (Table 4).

Table 4

Estimated Percentage Defoliation, Number of Pupae and Status, and Number of Spruce Budworm Egg Masses per Square Foot of Foliage, West Prince George District, 1960 and 1962

Locality	Percentage defoliation		No. pupae per sq. ft. foliage				No. egg masses per sq. ft. foliage	
			Adults emerged		Dead			
	Current	Total	1960	1962	1960	1962	1960	1962
Davie L.	5	10	0	0	0	0	0	0
Tudyah L.	30	30	1.45	0.50	0.09	0	1.05	0
Pine Pass	45	25	4.10	1.03	0.30	0.04	1.25	0.21
Big Creek	20	15	1.70	0.27	0.60	0.18	0.60	0.10
Takatoot L.	0	40	1.52	0	0	0.18	1.42	0
Tsayta L.	0	10	2.32	0	0	0	0.39	0
Takla L.	0	5	0.35	0	0	0	0	0

The additional mortality plots in alpine fir and white spruce understory were established at Davie Lake and Pine Pass, making a total of four in the West Prince George District. One hundred alpine fir and white spruce trees were tagged at each of the four localities to record the current and total defoliation. The heaviest defoliation occurred at Pine Pass where 70 per cent of the current year's foliage was lost (Table 5).

Table 5

Estimated Percentage Defoliation by Spruce Budworm of Current and Total Foliage on 100 Understory Alpine Fir and White Spruce Trees at Each of Four Plots, West Prince George District, 1962

Locality	Average d.b.h. (inches)	Average height (feet)	Percentage defoliation			
			Current		Total	
			1961	1962	1961	1962
Davie Lake	1.7	9.0	-	5	-	5
Tudyah Lake	2.0	11.2	70	30	25	40
Pine Pass	2.3	8.1	-	70	-	25
Big Creek	2.0	7.6	65	10	15	10

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

An infestation of Alaska spruce beetle occurred in a stand of white spruce on about 100 acres in the Kerry Lake district. The area consisted of small hills rising two to five hundred feet above the stream beds. The infestation occurred in the depressions, usually three to four chains wide, between the hills. White spruce forms an almost pure stand along the streams in the draws. Very few attacked trees were seen on the hill-tops where spruce intermingled with Douglas-fir and lodgepole pine.

A strip one chain wide by 25 chains long was run in early November to obtain information on the intensity of attack along the streams, (Table 6). Of 159 spruce trees 12 inches d.b.h. and over, 42 stems or 26 per cent were currently infested and seven stems or four per cent were attacked prior to 1962. Thirty-four per cent of the trees over 18 inches d.b.h. were currently infested. The size of trees most frequently attacked was the 20 to 24 inch d.b.h. group. All infested trees were heavily attacked from near ground level to well into the crown.

Table 6

Number and Condition of White Spruce Trees Attacked by Alaska Spruce Beetle on a Strip One by 25 chains, Kerry Lake, West Prince George District November 7, 1962

D.b.h.	No. healthy trees	No. trees attacked prior to 1962	No. trees attacked in 1962
12	13	0	0
14	12	3	3
16	16	0	4
18	16	1	5
20	18	0	8
22	12	2	6
24	16	0	10
26	6	0	2
28	1	1	3
30	0	0	1
Total	110	7	42

Although woodpeckers had removed the outer bark from approximately 75 per cent of the infested trees and destroyed many beetles, a large population of larvae and adults remained. During the winter woodpeckers may further deplete the population but it is unlikely that they will completely control the infestation. Part of the infestation will be logged during the winter of 1962-63. The area will be re-examined in 1963. The area between Kerry Lake and the infestation had been logged recently but slash was at a minimum. A total of 19 beetle-killed trees was counted in a strip 10 chains wide by 240 chains long in the logged area.

A small infestation of Alaska spruce beetle in white spruce in the vicinity of Davie Lake was reported late in 1962. No examination has been made to date.

Mountain Pine Beetle, _Dendroctonus_ _monticolae_ Hopk.

An aerial survey of red-topped lodgepole pine killed by the mountain pine beetle was made in the Fort St. James Ranger District in conjunction with the spruce budworm defoliation survey on July 24. The mountain pine beetle infestation has increased at Bivouac Creek in the Takla Lake district and also on the Kuzkwa River north of Tezzeron Lake.

Table 7

Lodgepole Pine Trees Killed by Mountain Pine Beetle, 1960 and 1961, as Determined by Aerial Surveys, West Prince George District, 1962

Locality	No. of trees	Est. volume (cu. ft.)
Bivouac Creek	4,000	160,000
Sakeniche River	780	31,200
Natowite Lake	1,105	44,200
Leo Creek	50	2,000
Kuzkwa River	2,250	90,000
South side Trembleur Lake	170	6,800
Total	8,355	334,200

An average volume of 40 cubic feet per tree was used in 1962 to determine the total volume of timber killed. Thirty-one cubic feet was used in 1961 to calculate the volume of timber killed; this was considered too low for these trees. The total estimated volume of lodgepole pine timber killed by mountain pine beetle in the Fort St. James Ranger District for 1960 and 1961 was 334,200 cubic feet (Table 7). The number of red-topped lodgepole pine trees counted in 1962 in this district was 64 per cent higher than in 1961.

Map 2 shows the location and number of red-topped lodgepole pine trees counted by aerial surveys in the West Prince George District in 1962.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The number of Douglas-fir trees killed by the Douglas-fir beetle declined by 34 per cent since the 1961 count. During an aerial survey on July 26 250 red-topped trees were counted in the Fort St. James Ranger District, a decrease of 125 trees. Table 8 gives the locality, number of red-top Douglas-fir counted and the estimated volume of timber killed at each locality.

Table 8

Douglas-fir Trees Killed by Douglas-fir Beetle 1959 to 1961, as Determined by Aerial Surveys, West Prince George District, 1962

Locality	No. of trees	Est. volume (cu. ft.)
Sowchea Bay (Stuart Lake)	35	2,450
Camsell Creek (Stuart Lake)	121	8,470
Opposite Tachie Village	61	4,270
Pinchi Lake	8	560
Mount Pope	25	1,750
Total	250	19,300

The total estimated volume of Douglas-fir trees killed by this beetle in the Ft. St. James Ranger District was 19,300 cubic feet. An average of 70 cubic feet per tree was used to calculate the volume killed.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

Counts of red-topped alpine fir trees were made at several localities in the Parsnip River, Pine Pass and Takla Lake area. The largest concentration of red-topped alpine fir was along the Parsnip River where 1,250 trees were attacked at Table River and 6,000 at Scovil Creek. Large numbers of grey alpine fir were observed in the Parsnip River, Pine Pass and Takla Lake areas. Table 9 gives the locality, number of trees and estimated volume killed by the western balsam bark beetle from 1957 to 1961 based on the assumption that beetle-killed alpine fir trees hold their needles for five years. An average of 30 cubic feet per tree was used to calculate the volume of timber killed. The total estimated volume of timber killed in the past five years in the foregoing areas is 318,000 cubic feet.

Table 9

Alpine Fir Trees Killed by Western Balsam Bark Beetle, 1957-1961 as Determined by Aerial Surveys, West Prince George District, 1962

Locality	No. of trees	Est. volume (cu. ft.)
South side Trembleur Lake	197	5,910
Middle River	60	1,800
Leo Creek	60	1,800
Tchentlo Lake	775	23,250
Kloch Lake	250	7,500
Bivouac Creek	250	7,500
Airline Lake	30	900
Tezzeron Lake	100	3,000
Natowite Lake	150	4,500
Missinka River	450	13,500
Table River	1,250	37,500
Misinchinka River	1,050	31,500
Scovil Creek	6,000	180,000
Total	10,622	318,660

Most of the red-topped alpine fir trees counted occurred in areas where heavy spruce budworm feeding had been reported for the past four years. There will probably be an increase in the number of red-topped alpine fir in the Nation Lakes district in 1963. Heavy spruce budworm feeding has occurred in this area for the past few years, weakening the trees, making them more susceptible to bark beetle attack.

Ambrosia Beetle, <u>Trypodendron</u> sp.

White spruce log decks were checked at several localities throughout the District for ambrosia beetle attack. These logs had been cut in the winter of 1961-62 and were examined in early June. The log decks were lightly attacked with the highest number of attacks per square foot being five.

An Engraver Beetle, <u>Ips engelmanni</u> Sw.

This engraver beetle infested white spruce logs at several millsites in the District. The heaviest attacks occurred on the surface logs in the decks and ranged from light to medium. No standing white spruce trees were known to have been attacked by this engraver beetle.

Round-headed Borer, Tetropium sp.

There was no report of appreciable Tetropium damage in log decks stored at mill sites or in the woods during the 1962 season.

Black Spruce Borer, Asemum atrum Esch.

No damage by this borer was found in log decks and wind-felled white spruce and alpine fir examined at several localities throughout the District. Two adults were caught in flight in July at Kennedy.

Oregon Fir Sawyer, Monochamus oregonensis Lec.

Large numbers of sawyer beetles were observed in flight near fresh logging slash at Kerry Lake and Windy Point during the latter part of July and early August. No reports of serious damage to decked white spruce logs were received during the summer. Adults were observed in flight from June 28 to September 14.

Poplar Borer, Saperda calcarata Say

Damage by the poplar borer was prevalent in the Vanderhoof and Sinkut Lake areas. The heaviest attack was along the north side of the Vanderhoof highway from Hulatt turnoff to Vanderhoof, where in a strip one half chain wide by 12.6 miles, 288 infested trees or seven per cent were counted (Table 10). In the Sinkut Lake district, 113 trees were attacked by this borer. The total number of infested trembling aspen trees in both of these areas is higher.

Table 10

Number of Trembling Aspen Trees Attacked by the Poplar Borer on a Strip One Half Chain by 12.6 Miles Long, West Prince George District, 1962

Mileage	Not attacked	Attacked
0 - 1	372	30
1 - 2	243	27
2 - 3	256	14
3 - 4	240	14
4 - 5	147	5
5 - 6	299	28
6 - 7	291	53
7 - 8	229	8
8 - 9	311	15
9 - 10	357	41
10 - 11	414	38
11 - 12.	405	6
12 - 12.6	305	9
Total	3,869	288

At Mile 18, Hart Highway, 25 trembling aspen trees were infested. Two adult poplar borers were caught in flight at Mile 18 Hart Highway and Sinkut Lake on August 3 and September 5 respectively.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The aspen leaf miner population decreased at all sample plots in the West Prince George District. The average decrease was 20 per cent and based on the small number of adults produced per leaf surface in 1962, a further decline in population is expected in 1963 (Table 11). For sampling, two apical branches 12 inches long were cut from the lower crown of five sample trees at each of the five plots. Parasitism and mortality from other causes increased in all plots in 1962 (Table 12).

Table 11

Percentage of Aspen Leaf Surfaces Mined and Number of Aspen Leaf Miner Adults Produced per Leaf Surface, West Prince George District 1959 to 1962

Locality	Percentage of leaf surfaces with mines				No. of adults produced per leaf surface			
	1959	1960	1961	1962	1959	1960	1961	1962
Mile 8, Hart Hwy.	27	72	89	75	0.07	0.59	0.53	0.20
Shelley	-	72	86	83	-	0.53	1.65	0.11
Salmon Valley	28	52	91	77	0.09	0.04	0.77	0.25
Mile 80, Hart Hwy.	-	-	89	86	-	-	0.51	0.19
Mile 110, Hart Hwy.	-	-	95	43	-	-	0.65	0.08

Table 12

Mortality of Aspen Leaf Miner in Cocoons Based on 100-cocoon Samples at Five Plots, West Prince George, 1959 to 1962

Locality	Percentage Mortality							
	Parasitism				Other causes			
	1959	1960	1961	1962	1959	1960	1961	1962
Mile 8, Hart Hwy.	8	10	22	28	60	6	17	25
Shelley	-	4	26	40	-	15	10	30
Salmon Valley	5	9	19	32	61	10	8	20
Mile 80, Hart Hwy.	-	-	34	35	-	-	16	30
Mile 110, Hart Hwy.	-	-	12	24	-	-	12	27

A Pitch Nodule Maker, Petrova sp.

Lodgepole pine reproduction at Bear Lake on the Hart Highway was lightly attacked by a pitch nodule maker. No damage was noted at other points of the District where lodgepole pine occurred.

Larch Sawfly, Pristiphora erichsonii (Hartig)

Five larch sawfly larvae were collected from Tamarac Lake, and 17 larvae from the Cluculz Lake stand in three-tree beating samples. No sawflies were collected from these stands in 1961.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Defoliation of trembling aspen stands in the Finlay Forks area was reported by the B. C. Forest Service in 1962. It was believed to have been caused by forest tent caterpillars, but no specimens were obtained as the area is quite inacessible.

Green-headed Spruce Sawfly, Pikonema dimmockii Cress.

The occurrence and abundance of the green-striped spruce sawfly decreased in 1962. The incidence of larvae in three-tree beating collections from white spruce taken during the larval period June 12 to August 24 for 1959-1962 is shown as follows:

No. of collections during larval period				Percentage containing larvae				Av. no. of larvae per positive sample			
'59	'60	'61	'62	'59	'60	'61	'62	'59	'60	'61	'62
76	52	67	72	33	23	29	14	1.4	1.6	2.0	1.7

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Populations of this sawfly increased in 1962 compared with the 1961 level. The following table compares the incidence of Pikonema alaskensis Roh. in 3-tree beating collections from white spruce taken during the larval period June 12 to August 24 for 1959-1962.

No. of collections during larval period				Percentage containing larvae				Av. no. of larvae per positive sample			
'59	'60	'61	'62	'59	'60	'61	'62	'59	'60	'61	'62
76	52	67	72	35	21	29	26	2.2	1.1	1.6	2.1

Green Spruce Looper, Semiothisa granitata complex

Larval populations of the looper decreased in 1962. The preferred hosts were white spruce, Douglas-fir and lodgepole pine. The following table shows the incidence of green spruce loopers in three-tree beating collections from white spruce taken during the larval period, July 15 to September 9, for 1960-1962.

No. of collections during larval period			Percentage containing larvae			Av. no. of larvae per positive sample		
1960	1961	1962	1960	1961	1962	1960	1961	1962
42	50	32	28.5	66.0	53	1.7	4.8	2.3

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

White spruce reproduction south of Summit Lake along the Hart Highway was again lightly infested by this weevil. Parasitism was heavy in all infested leaders examined, ranging up to 100 per cent. Single infested white spruce were also noted along the Hart Highway from Summit Lake to Salmon Valley. Parasitism was also high in this area. No new attacks were noted along the Sutherland River Access road where infested white spruce was observed in 1961.

Mourning Cloak Butterfly, Nymphalis antiopa (L.)

Populations of this defoliator remained at a low level throughout the District in 1962. No defoliation of aspen was observed in the Beaverley district where light defoliation of three trembling aspen trees occurred in in 1961. Light defoliation of willow bushes was observed along the Hart Highway at Mile 40.

Green Larch Looper, Semiothisa sexmaculata Pack.

The number of green larch loopers collected from two small eastern larch stands at Tamarac and Cluculz lakes decreased in 1962. Ten larvae were collected in a three-tree-beating sample at Tamarac Lake and three at Cluculz Lake compared with 60 and 47 larvae respectively in 1961.

A Cone Pyralid, Dioryctria abietivorella D.-S.

This cone borer, common on lodgepole pine, remained at a low population level throughout the District.

Douglas-fir Needle Miners, Contarinia spp.

Reproduction Douglas-fir at Mile 38 Hart Highway was again lightly infested by these needle miners. Most of the affected needles were infested by C. pseudotsugae Condr. with a small percentage infested by C. cuniculator Condr. and C. constricta Condr. Light attacks were observed on Douglas-fir in the Cluculz Lake district. No evidence of Douglas-fir needle miners was noted in other parts of the District.

Spruce Gall Aphid, Adelges cooleyi Gill.

White spruce tips were infested by this aphid at several areas throughout the District where Douglas-fir occurred in the stand or close by. The percentage of white spruce tips infested was determined by taking three white spruce trees at random at each locality and counting the number of infested and non-infested tips on one branch from each tree. The degree of infestation was classified as follows: light, 0-20; medium, 20-50; and heavy, 50-100 per cent of the tips infested. Table 13 gives the degree of infestation at nine localities in the District.

Table 13

Spruce Gall Aphid Infestations on White Spruce, West Prince George District, 1962

Locality	Elevation	Degree of infestation
Engen	2,200	Light
Mile 42 Hart Hwy.	2,400	Light
Clauminchil Lake	2,400	Light
Isle Pierre	2,300	Light
Telachick	2,300	Medium
Baldie Hughes	2,300	Medium
McKenzie Mt.	2,600	Light
Reid Lake	2,300	Light
Fraser Lake	2,000	Medium

Black-headed Budworm, Acleris variana (Fern.)

The population of this budworm remained at a low level in 1962 throughout the District. Larvae were collected from four localities, three collections from white spruce and one from alpine fir. White spruce collection at Ness Lake and Pine Pass contained two larvae each.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

A few hemlock looper larvae were collected from white spruce and alpine fir in several localities in the District. Collections from alpine fir contained .28 larvae per three-tree beating along the Hart Highway from Salmon River to Kerry Lake. No larvae were taken from alpine fir collections in other localities in the District. Two white spruce collections at Summit Lake contained two larvae each.

OTHER NOTEWORTHY INSECTS

Insect	Host	No. of collections	Remarks
Anoplonyx luteipes (Cress)	Le	1	only one larva collected at Tamarac Lake
Caripeta divisata Wlk.	Sw	9	decrease from 1961 level
Ectropis crepuscularia Schiff.	Ba	6	slight drop in population in 1962
Enargia decolor Wlk.	A	1	not collected in 1961
E. infumata Grt.	A	1	not collected in 1961
Epirrita autumnata Harr.	Ba, Sw, A	29	common throughout District
Griselda radicana Wlshm.	Ba	1	scarce throughout District
Nematocampa filamentaria Gn.	A	1	uncommon
Neodiprion spp.	Pl, F, Sw	24	18 larvae from F in a single collection
Operophtera bruceata Hlst.	A, Cot	3	decrease from 1961; Summit L. area
Pero morrisonarius Hy. Edw.	Biw	2	not found in 1961
Zeiraphera diniana Gn.	Le	2	not found in 1961
Z. fortunana Kft.	Sw	2	not found in 1961

STATUS OF FOREST DISEASES

Important Diseases

Melampsora Rust of Trembling Aspen

A survey of trembling aspen was made in late summer and fall at 39 localities throughout the District to determine the distribution of *Melampsora albertensis* Arth. The uredinial state of the rust on the leaves of the poplar host was found at all localities checked. Intensity of infection ranged from medium to heavy along the Hart Highway and from light to heavy along the Vanderhoof Highway from Prince George to Endako.

Flagging of Alpine Fir Branches

Red flagging on alpine fir branches caused by an unknown disease was again common on reproduction and pole-sized alpine fir trees along the Hart Highway at Summit Lake, Bear Lake and McLeod's Lake. Several collections of infected branches were sent to the Pathology Unit in Victoria for identification. The fungus most commonly associated with this condition is *Scleroderris* sp.

A Needle Rust on Lodgepole Pine

Lodgepole pine reproduction growing along the edge of a field on the Old Summit Lake road had its needles lightly infected by a needle rust caused by *Coleosporium asterum* (Diet.) Syd. Five trees were found to be infected by the rust at this locality. No other lodgepole pine were found to be infected by this rust.

Needle Rust on White and Black Spruce

Witch's brooms on white and black spruce, caused by *Chrysomyxa arctostaphyli* Diet. were again common throughout the District where these trees occurred. The heaviest infections on white spruce were found in the Sob Lake and Punchaw districts and, on black spruce, along the Manson Creek Road at Mile 40.

Lodgepole Pine Stem Canker

A stem canker fungus *Atropellis piniphila* (Weir) Lohn. and Cash. was found at several localities in the District lightly infecting lodgepole pine. The heaviest infection again occurred on the lower Mud River and along the Punchaw Cutoff road.

Browning of Aspen Leaves

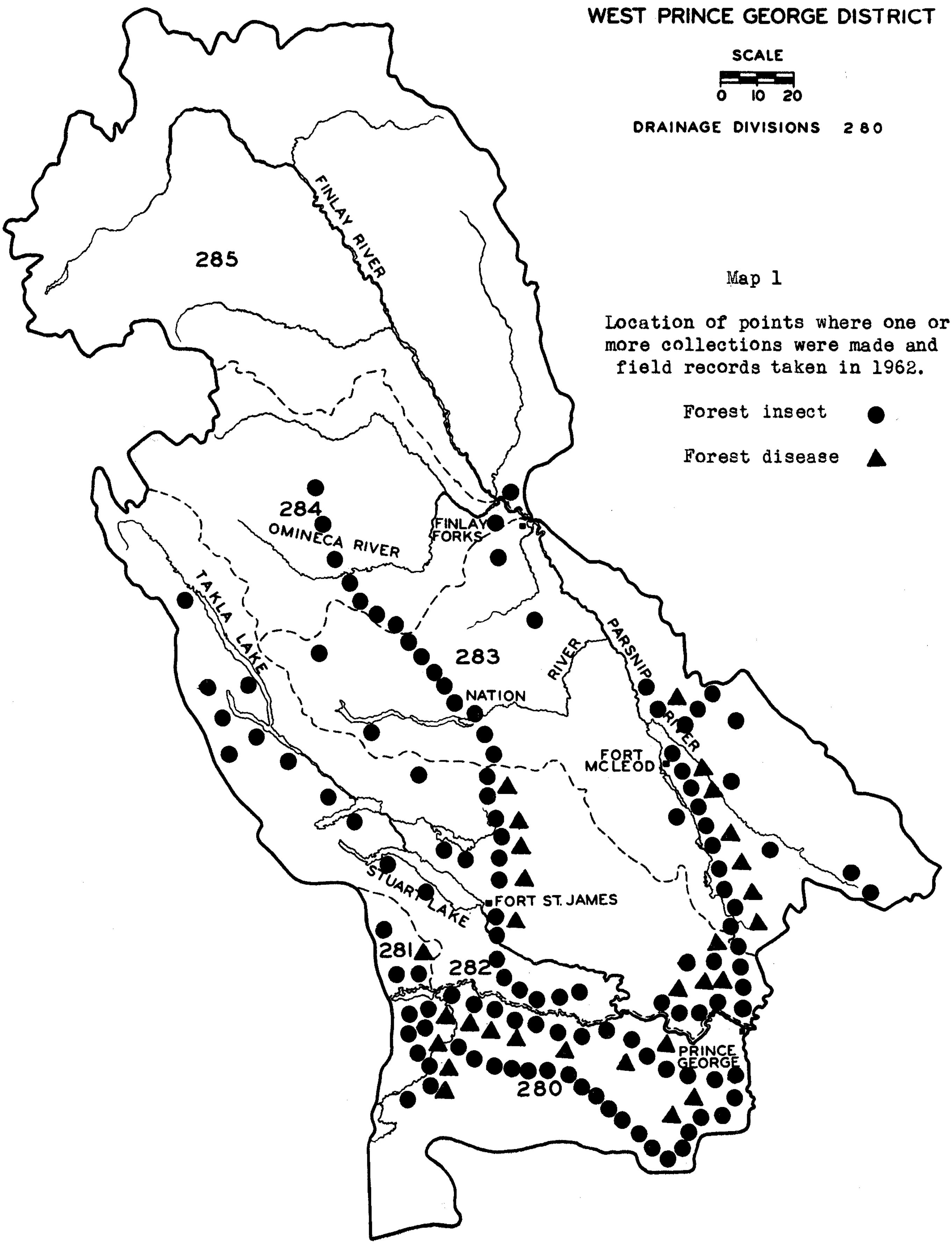
A group of trembling aspen trees in the Saxton Lake district had 25 per cent of their leaves turning brown from infection by *Sclerotium* sp. The condition was not noted in other areas of the District.

A Foliage Disease of Aspen

Browning of the foliage of trembling aspen stands along the Hart Highway from Prince George to Kerry Lake was attributed to infection by *Marssonina brunnea* (Ellis and Everh.) Sacc. Along the Vanderhoof Highway from Prince George to Endako aspen stands were lightly infected by this disease.

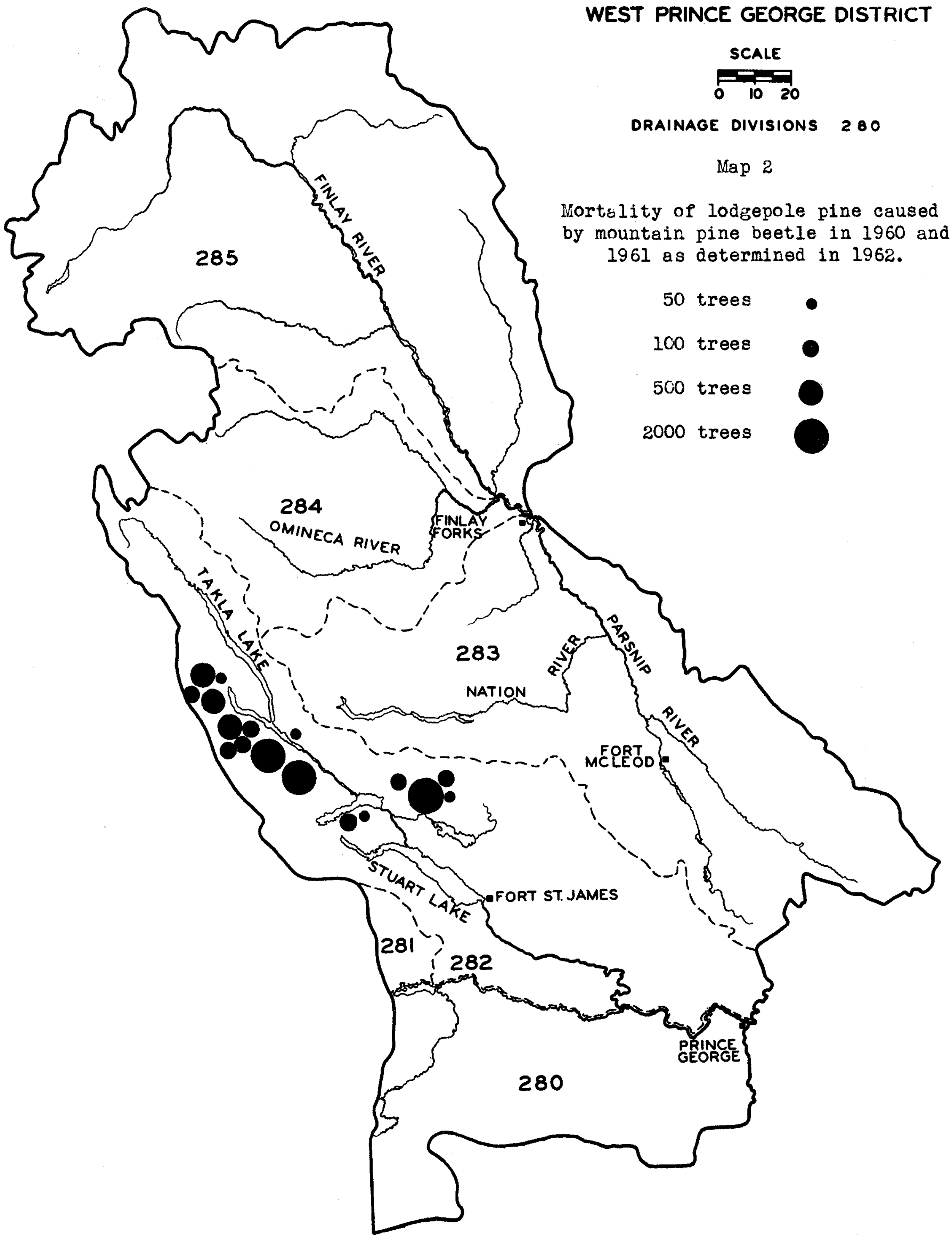
OTHER NOTEWORTHY DISEASES

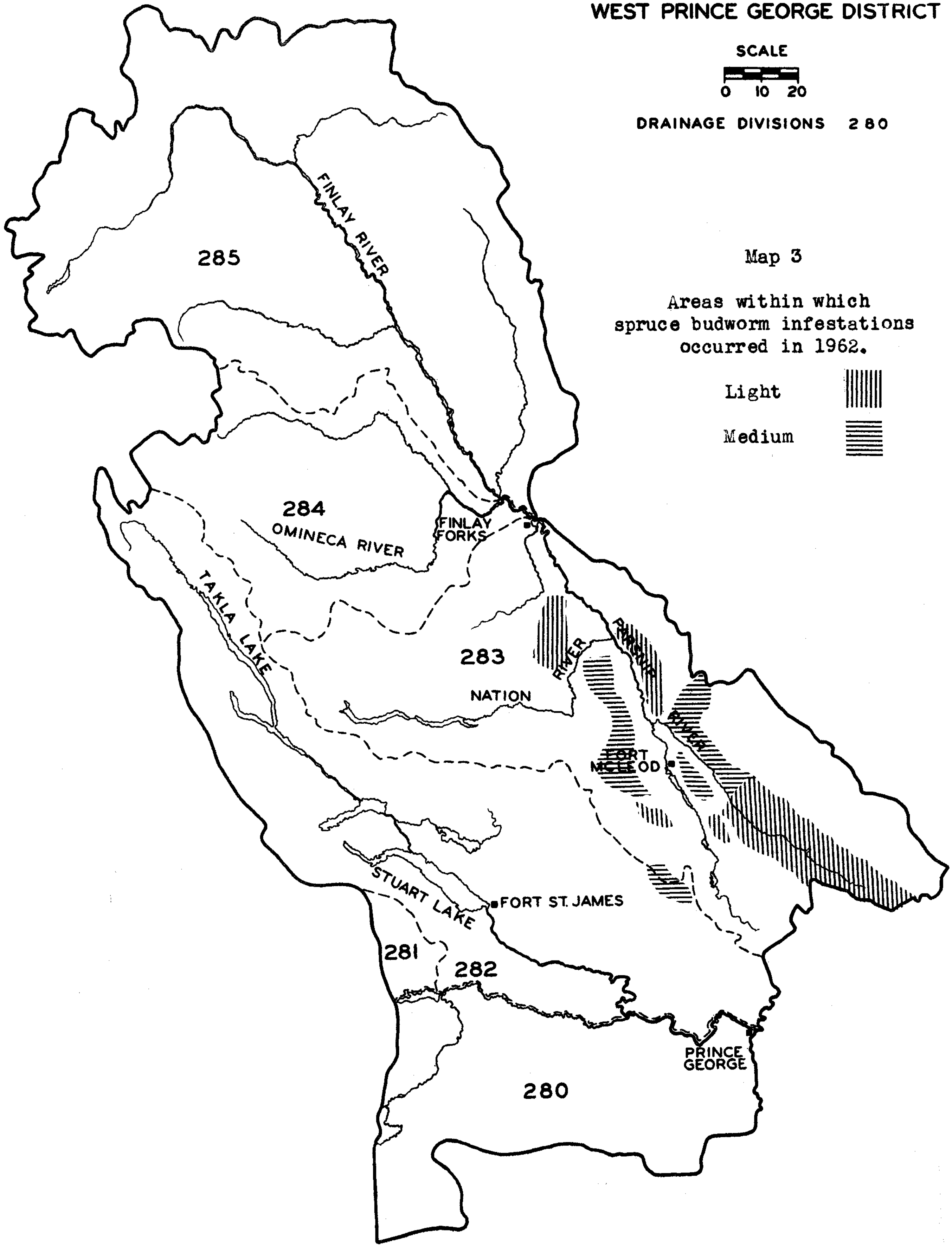
Host	Organism	Locality	Remarks
Willow sp.	Melampsora epitea Thüm.	Mud River Sob Lake Punchaw Summit Lake Rd.	Leaf rust common on willows in these areas.
Lodgepole pine	Arceuthobium americanum Nutt.	Bear Lake, Otway, Miworth Ft. Fraser	Mistletoe on branches of smaller lodgepole pine trees.
Trembling aspen	Fomes igniarius (L. ex Fr.) Kickx	Ft. Fraser	Common on aspen in this area.



Map 1

Location of points where one or more collections were made and field records taken in 1962.


WEST PRINCE GEORGE DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 280
Map 2
Mortality of lodgepole pine caused by mountain pine beetle in 1960 and 1961 as determined in 1962.
50 trees
100 trees
500 trees
2000 trees
285
FINLAY RIVER
284
OMINECA RIVER
FINLAY FORKS
TAKLA LAKE
283
NATION RIVER
PARSNIP RIVER
FORT MCLEOD
STUART LAKE
FORT ST. JAMES
281
282
PRINCE GEORGE
280


WEST PRINCE GEORGE DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 280
Map 3
Areas within which spruce budworm infestations occurred in 1962.
Light
Medium
285
FINLAY RIVER
284
OMINECA RIVER
FINLAY FORKS
TAKLA LAKE
283
NATION RIVER
PARSNIP RIVER
FORT McLEOD
STUART LAKE
FORT ST. JAMES
281
282
PRINCE GEORGE
280

FOREST INSECT AND DISEASE SURVEY

NORTH PRINCE GEORGE DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

NORTH PRINCE GEORGE DISTRICT

1962

E. G. Pottinger

INTRODUCTION

The field season in the North Prince George District began on May 23 and continued until September 7. Aerial survey flights were made by courtesy of the British Columbia Forest Service, for the purpose of mapping climatic injury to conifers in the Pine Pass area and determining the extent of the forest tent caterpillar infestation at the Peace River. These flights were made on June 4 and 12 respectively for a total flying time of five hours.

Eight permanent sample stations were established and sampled in the North Prince George District in 1962. A total of 341 forest insect and 17 forest disease collections were submitted and appear by host in Table 1.

The distribution of forest insect and disease collections submitted in 1962 is shown on Maps 1 and 2. Maps 3 and 4 indicate the extent of winter injury to conifers in the North Prince George District which occurred during the winter of 1961-1962.

Table 1

Collections by Hosts

North Prince George District, 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Fir, alpine	16	1	Aspen, trembling	51	4
Juniper, common	1	0	Alder spp.	14	1
Larch, eastern	30	0	Birch spp.	21	0
Pine, lodgepole	47	3	Cottonwood, black	35	0
Spruce, black	30	0	Willow spp.	2	1
Spruce, white	89	5	Miscellaneous	5	2
			Total	128	8
Total	213	9	Grand total	341	17

STATUS OF INSECTS

One-year-cycle Spruce Budworm, Choristoneura fumiferana (Clem.)

Populations of the one-year-cycle spruce budworm continued to increase in the North Prince George District in 1962. The infestation near Smith River remained active, but has not spread appreciably since 1960. Defoliation was severe on white spruce in 1962 and trees with dead tops were noted throughout the infestation. A forest fire that killed all trees for 10 miles south of the outbreak in the summer of 1961 may assist in preventing the insect from spreading in this direction. Spruce budwoorm larvae were feeding vigorously and appeared to be mostly in the fourth instar when the infestation was first visited on June 28.

A new infestation was discovered near Kledo River between miles 330 and 350 on the Alaska Highway. It extends for approximately 150 square miles through a white spruce-alpine fir stand.

Branch samples were taken from each infestation near designated mileposts along the Alaska Highway. At each point sampled two 18 inch branches were examined from each of two trees. From these examinations the following data were obtained: (a) percentage of tips defoliated (Table 2), samples taken during the last week in June; (b) percentage of defoliation on tips (five classes), and (c) counts of egg masses. The two latter examinations were made in late August. In addition ocular estimates of defoliation were made from groups of 10 white spruce trees at five sampling points in each infestation (Table 4).

Table 2

Percentage of White Spruce Tips Defoliated by One-year-cycle Spruce Budworm, Smith River Infestation, 1960 and 1962

Mileposts Alaska Highway	1960	1962
496	23	100
502	42	100
506	54	100
509	62	100
512	100	97
514	94	100
516	96	94
522	73	100
528	54	100
532	14	75
538	27	92
542	-	4

Table 3

Percentage of White Spruce Tips Defoliated by One-year-cycle Spruce Budworm, Kledo River Infestation, July, 1962

Mileposts Alaska Highway	1962
330	20
334	43
336	100
338	81
342	100
344	7
347	33
350	2

Table 4

Estimated Defoliation of White Spruce Trees, North Prince George District, 1959, 1960 and 1962

	Mileposts Alaska Highway	1959	1960	1962
Smith R.	496	0	1	8
	502	7	20	22
	514	92	90	20
	528	2	3	75
	538	0	2	48
Kledo R.	330	-	-	6
	335	-	-	15
	340	-	-	10
	345	-	-	7
	350	-	-	2

Bud kill at the Smith River infestation was more general in 1962 than in previous years. Average bud-kill was lower than in 1959 but higher than in 1960. Very little adventitious budding was present. The spruce trees in the area were lacking in vigour and appeared incapable of additional growth.

Table 5

Percentage of White Spruce Tips in Five Defoliation Classes at Six Localities in the Smith River Spruce Budworm Infestation, North Prince George District, 1960 and 1962

Mileposts Alaska Highway	Percentage defoliation									
	100 buds killed		100 buds living		70		40 - 70		0 - 40	
	1960	1962	1960	1962	1960	1962	1960	1962	1960	1962
494	2	43	5	57	17	0	22	0	54	0
502	19	33	60	67	11	0	6	0	6	0
506	13	43	58	56	13	1	9	0	7	0
514	8	31	28	55	41	4	1	0	25	0
528	14	25	27	41	11	11	21	10	26	14
538	7	21	3	25	14	7	23	13	53	34

Table 6

Percentage of White Spruce Tips in Five Defoliation Classes at Five Localities in the Kledo River Spruce Budworm Infestation, North Prince George District, 1962

Mileposts Alaska Highway	Percentage defoliation				
	100 buds killed	100 buds living	70	40 - 70	0 - 40
330	4	4	7	8	77
335	23	57	9	7	4
340	6	37	24	14	19
345	2	14	14	23	47
350	2	3	5	9	81

Most of the trees examined at this infestation bore thin foliage, a result of heavy feeding in previous years. The heavy defoliation which occurred in 1961 also reduced the number of new tips put forth in 1962, and where new growth was put forth, it was usually consumed together with a certain amount of old foliage. Some feeding occurred on lodgepole pine at Mile 514 Alaska Highway where 60 per cent of the current year's tips were damaged.

Eastern larch trees growing within the Kledo River infestation suffered defoliation of varying severity. At Mile 338 Alaska Highway, an eastern larch stand averaging six inches d.b.h. was 70 per cent defoliated by spruce budworm.

Table 7

Spruce Budworm Egg-mass Populations in the Smith River and Kledo River Infestations, 1961 and 1962

Mileposts Alaska Highway		Branch area (sq. ft.)		Number egg masses		Av. no. egg masses per 100 sq. ft. of foliage	
		1961	1962	1961	1962	1961	1962
Smith R.	494	3.7	7.5	13	1	351	13
	502	3.5	9.0	4	8	114	89
	506	3.3	7.0	5	3	152	43
	514	2.9	5.7	8	1	276	18
	528	3.2	5.6	19	76	594	1337
	538	2.9	4.6	4	16	138	348
Kledo R.	330	-	7.1	-	4	-	56
	335	-	12.7	-	2	-	16
	340	-	9.9	-	5	-	51
	346	-	10.7	-	134	-	1247
	350	-	14.6	-	15	-	98

The trend for the last four years has been a general decrease in the number of egg masses in the central and southern part of the Smith River infestation an almost proportional increase in the northern portion. This tendency continued in 1962 as is shown in Table 7.

As the Kledo River infestation was not discovered until 1962, previous egg mass counts are not available (Table 7). As the number of egg masses required for heavy defoliation is approximately 200 per 100 square feet of foliage, larval populations are expected to be high at several points within the two spruce budworm infestations in 1963.

Random beating collections containing one-year-cycle spruce budworm were widespread in 1962. The percentage of collections containing larvae and the average number of larvae per positive collection were calculated from the coniferous host collections taken within the range of this budworm. These figures were broken down into drainage divisions and appear in Table 8. Those collections taken within known infestations were not included.

Table 8

Three-tree Beating Collections Containing One-year-cycle Spruce Budworm, North Prince George District, 1962

Drainage division	Host	Total no. of collections during larval period	Percentage of collections containing larvae	Av. no. larvae per positive collection
302	Sw	15	67	5.6
	Sb	3	25	1.0
	Le	8	37	1.3
	Ba	1	100	1.0
	Pl	14	0	1.0
304	Sw	6	33	60.5
307	Sw	2	0	-

Two-year-cycle Spruce Budworm, *Choristoneura fumiferana* (Clem.)

The two-year-cycle spruce budworm infestation in the Pine Pass area continued to be light in 1962. The Link Creek plot, 145 miles north of Prince George, was sampled on June 18. One 18 inch branch was examined from each of the 10 sample trees and at this date there were 3.4 larvae per square foot of foliage surface on the white spruce and alpine fir branch samples.

On August 23 the Link Creek plot was revisited and another 18 inch branch was removed from each of the sample trees and the following information was recorded: (a) number and condition of tips, (b) number of pupae (dead and alive) per square foot of foliage, (c) number of egg masses per square foot of foliage, (d) current and total defoliation. Of the 757 tips examined, 20 per cent had been killed by budworm larvae in 1962. Mortality in the pupal stage was high; dead pupae averaged 0.54 per square foot of foliage compared with 0.39 successfully emerged. The average defoliation of the current year's growth on the branch samples was 18 per cent while 13 per cent of all foliage had been destroyed. Five egg masses were found on the 10 branch samples, indicating that there was an average of 0.16 egg masses per square foot of foliage surface. Based on these egg counts, a light population is anticipated again in 1963.

Table 9 shows the extent of tip damage present on one 18 inch branch sample from each of three trees at 11 points within the spruce budworm infestation. Although the average defoliation increased compared with 1960 the percentage of tips damaged did not exceed 68 per cent.

Table 9

Percentage of Tips Defoliated by Two-year-cycle Spruce Budworm on Branch Samples, Pine Pass, North Prince George District, 1960 and 1962

Mileposts Hart Highway	Tree Species	1960	1962
0	Ba	26	38
4.6	Sw	24	12
9.5	Sw	100	31
13.6	Sw	50	53
13.6	Ba	51	68
18.6	Sw	33	43
23.7	Sw	6	20
30.1	Sw	8	31
33.0	Sw	14	23
38.2	Sw	9	20
41.2	Sw	7	33

A second plot consisting of 100 white spruce and alpine fir understory trees was established on August 23 at Link Creek. The trees averaged 1.5 inches d.b.h. and 7.2 feet in height. Defoliation of new growth on these understory trees averaged 16.7 per cent and total defoliation averaged 14.4 per cent.

Budworm larvae were taken frequently in random collections during June. The most notherly collection was at Mile 65 Alaska Highway where four larvae were obtained from white spruce on June 4. The most spruce budworm larvae taken in one three-tree beating, other than in an infestation, was at Mile 24 Gold Bar Road on June 14 when 21 larvae were collected.

Western Balsam Bark Beetle, <u>Dryocoetes confusus</u> Sw.

Specimens of this scolytid were collected at Callazon Creek in Pine Pass on September 5, where red-topped alpine fir were observed in 1961. An aerial survey of the areas north and west of Pine Pass was conducted on July 30 by the South Prince George and West Prince George rangers. The infestation extended in a north-westerly direction on both sides of the Callazon Creek Valley and from there followed Clearwater Creek to its confluence with the Peace River. Approximately 16,000 dead alpine fir were counted and with the addition of 4,000 red-tops east of Callazon Creek, the total number was about 20,000 representing approximately 600,000 cubic feet of timber.

Ostomatid larvae of the genus Temnochila, which are predacious, were present under the bark of the trees infested with the balsam bark beetle. Some alpine fir, attacked at an earlier date, also contained Monochamus and buprestid larvae.

Larch Sawfly, Pristiphora erichsonii (Htg.)

The larch sawfly is present at infestation levels between Mile 160 and 280 on the Alaska Highway, at Mile 32.5 Beatton River Road, and between Bisset and Wildmare Creeks, Hart Highway. While defoliation was evident at both latter locations and in some stands bordering the Alaska Highway, the only top-kill observed was between Bisset and Wildmare creeks. The first collection containing this tenthredinid was made on July 14 at Mile 265 Alaska Highway when 431 larvae were present in one three-tree beating. On July 25 three-tree beating collections containing 72 and eight larvae respectively were taken at miles 10 and 29 Monkman Pass Road. Two curled tips were present on a larch tree at Mile 56, Cassiar Road on August 10 but no sawfly larvae were found. The last larch sawfly larvae collected in 1962 were taken on September 4, 10 miles west of East Pine on the Hart Highway.

The sequential sampling method was employed where larval populations were high enough to be categorized as light, moderate or severe. By this technique, two branch samples were removed from a representative tree within the stand and the current year's tips examined in groups of 10. The number of tip groups and the total number of curled tips within the groups were then compared with the figures in the sequential sampling table and the degree of infestation was determined. The outbreak was classified as severe at Miles 163 and 227 on the Alaska Highway; elsewhere it was light to moderate (Table 10).

Table 10

Sequential Sampling for Larch Sawfly, North Prince George District, 1962

Locality (Mileposts)		No. of tip units examined (by 10's)	No. curled tips (cumulative)	Degree of infestation
Alaska Highway	163	2	27	severe
	227	12	37	severe
	238	8	3	light
	243	7	2	light
	247	14	8	light
	253	10	17	moderate
	260	12	17	moderate
	275	9	4	light
Beaton R. Road	32.5	10	16	moderate
Hart Highway		11	20	moderate

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The extent of the "Taylor" forest tent caterpillar infestation south of the Peace River Bridge was determined by a one hour flight on June 12. Since 1961, when this infestation was first reported, the area of severe defoliation has increased from six square miles to approximately 30 square miles. The defoliated trees leafed out again in 1962 and no top-kill was observed in the area attacked in 1961.

In late May and early June, subnormal temperatures and above average rainfall accompanied by winds caused the caterpillars to cluster in colonies on the main stems and branches of their hosts, which included trembling aspen, black cottonwood, birch, willow, alder and ground cover shrubs. Clustering of larvae continued until June 7, when warmer weather allowed them to disperse and resume feeding. Individual larval colonies were also noted on trembling aspen at miles 49, 55 and 65, Alaska Highway, and at East Pine on the Hart Highway.

On September 2 and 3, a sequential sampling method developed by R.F. Shepherd of the Calgary Laboratory (Sequential Sampling of the Forest Tent Caterpillar, Canada Dept. For., For. Ent. and Path. Br., Mar. 1961) was used at five plots to determine the overwintering egg mass populations at the Taylor infestation. By this method, the egg masses were counted on two 18-inch branch samples taken from the upper crown of a representative aspen. The branches removed were the outermost part of two of the top four branches of the tree. Sampling continued until the cumulative number of egg masses fell into one of the defoliation classes. Heavy defoliation is anticipated at four of the five localities sampled (Table 11).

Table 11

Sequential Sampling at Five Points Within the Taylor Forest Tent Caterpillar Infestation, September 1962

Mileposts Alaska Highway	No. of trees examined	No. of egg masses	Degree of infestation
2 Mi. east of Mi. 34	3	24	heavy
1 Mi. east of Mi. 34	1	14	heavy
½ Mi. west of Mi. 34	6	20	heavy
Mi. 30	4	17	heavy
Mi. 29	6	4	light

Aspen Leaf Miner, Phyllocnistis populiella Cham.

There has been a general decrease in the aspen leaf miner population in the North Prince George District since 1958. The heaviest populations were between miles 533 and 647, Alaska Highway, and from Fisher Creek to Chetwynd on the Hart Highway. The average percentage of leaves mined was 27 per cent at the former location and 35 at the latter. Mined leaves averaged less than two per cent from Dawson Creek to Muncho Lake. An average of five per cent of the aspen leaves were damaged along the Hart Highway between Chetwynd and Dawson Creek. These figures were obtained from the examination of 50 aspen leaves at regular intervals along the Hart and Alaska highways.

The four previously established aspen leaf miner plots were sampled during the first week of August. The leaves on two 12-inch branch samples taken from each of five trees at every plot were examined. The percentage of leaf surfaces mined and the number of adults produced per leaf surface decreased in all four plots (Table 12). Parasitism increased only at Prochniak Creek, but remained at significant levels at the other localities (Table 13).

Table 12

Percentage of Aspen Leaf Surfaces Mined and Number of Adult Leaf Miners Produced in Samples, North Prince George District, 1960, 1961 and 1962

Location	Percentage of leaf surfaces with mines			Number of adults per leaf surface		
	1960	1961	1962	1960	1961	1962
Prochniak Creek	4.3	4.3	4.2	0.	0.09	0.01
Smith River	50.9	11.5	10.2	0.05	0.06	0.01
Hyland River	25.2	26.9	4.7	0.02	0.03	0.01
Mi. 45.5 Cassiar Rd.	4.4	0.7	0.5	0.02	0.	0.

Table 13

Mortality of Aspen Leaf Miners in Cocoons, Based on 100 Cocoon Samples from Four Plots, North Prince George District, 1960, 1961 and 1962

Location	Percentage mortality in cocoon stage					
	Parasitised			Other causes		
	1960	1961	1962	1960	1961	1962
Prochniak Creek	15	33	45	28	33	15
Smith River	49	38	37	12	8	30
Hyland River	70	46	39	7	14	3
Mi. 45.5 Cassiar Rd.	44	-	35	22	-	14

Oregon Fir Sawyer, Monochamus oregonensis Lec.

Decked white spruce logs totalling 12,500 cubic feet were heavily infested with this borer at Mile 335 Alaska Highway. The logs averaged 12 inches in diameter; some had been felled in April 1961 and some in the winter of 1960-1961. Exit holes averaged five per square foot of wood surface when the logs were last examined on June 22. The logs were milled at this site in July, 1962.

At Mile 293, Alaska Highway approximately 8,300 cubic feet of white spruce were lightly infested with Monochamus. One adult female was seen near the decked logs, which were cut in the winter of 1961-1962.

Poplar Borer, Saperda calcarata Say

Four black cottonwood and two aspen at East Pine, and four black cottonwood at Mile 19 Hudson Hope Road were attacked by this borer. The most heavily infested tree was a black cottonwood at East Pine six inches d.b.h. and 45 feet in height. This tree had 19 entrance holes and was felled for larval samples and sections to be used for caging. Entrance holes on three infested trees were later enclosed with wire screening to obtain adults but none appeared in 1962.

Eastern Larch Beetle, Dendroctonus simplex Lec.

Two felled eastern larch, five miles east of Chetwynd were infested with this Dendroctonus when examined on June 6. The logs, eight and 12 inches d.b.h, contained only parent adults when examined at this date. When the area was revisited on July 19, however, a beetle-killed larch tree was discovered which contained larvae, teneral adults and parent beetles. A final inspection at this location on September 4 revealed only a few adults in the previously infested tree and no other recent attacks.

A Poplar Leaf Miner, Phyllocnistis sp.

The population of this gracillarid continued to follow the decreasing trend of the aspen leaf miner in 1962. Sampling was the same as in 1960 and consisted of examining 50 black cottonwood leaves picked at random from trees beside the Alaska Highway. From Mile 424 to 647, Alaska Highway, the intensity ranged from 0 to 64 per cent of the leaves infested with an average of 26.5 per cent for 15 points between these locations. Table 14 compares the figures for 1962 with those for 1958 and 1960.

Table 14

Percentage of Black Cottonwood Leaves Infested by *Phyllocnistis* sp. along the Alaska Highway

Locality (mileposts) Alaska Highway			Percentage leaves infested		
1958	1960	1962	1958	1960	1962
424	428	424	18	0	0
476	478	476	100	10	0
501	498	501	100	72	24
506	508	506	20	68	23
533	538	533	100	74	12
571	578	571	100	90	59

A Leaf Miner on Willow, *Phyllocnistis* sp.

The population of this miner has declined since it was last sampled in the North Prince George District in 1960. Fifteen 50-leaf samples were taken from Mile 485 to 635, Alaska Highway, in order to determine the trend of the leaf miner population. The greatest percentage of leaves mined was between Miles 498 and 535, Alaska Highway, where an average of eight per cent of the willow leaves were infested. The average percentage of leaves mined from Mile 485 to 625 was 3.7, a decrease of approximately three per cent compared with 1960.

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* Roh.

Although this sawfly was collected throughout the District, it caused no noticeable defoliation in 1962. The larval population was slightly lower in 1962 than in previous years. The figures in Table 15 were taken from positive three tree beating collections of white spruce during the larval period which was considered to extend from July 14 to August 28.

Table 15

Three-tree Beating Collections of Yellow-headed Spruce Sawfly on White Spruce, North Prince George District, 1958, 1959, 1960 and 1962

Year	Total no. collections taken during larval period	Percentage of collections containing larvae	Av. no. larvae per positive sample
1958	65	30.8	1.5
1959	65	47.7	2.5
1960	50	54.0	2.5
1962	36	30.8	1.5

Green-headed Spruce Sawfly, Pikonema dimmockii Cress.

Larvae of this insect continued to appear regularly in beating collections in the North Prince George District in 1962. This is shown in Table 16 where the percentage of three-tree beating collections containing larvae and the average number of larvae per positive sample are compared with figures from three previous years.

Two P. dimmockii larvae were collected from black spruce in two samples, as was also the case in 1960. The earliest collection containing this larva was on June 23 and the latest was on August 28.

Table 16

Three-tree Beating Collections of Green-headed Spruce Sawfly on White Spruce, North Prince George District, 1958, 1959, 1960 and 1962

Year	Total no. collections taken during larval period	Percentage of collections containing larvae	Av. no. larvae per positive sample
1958	44	4	1.0
1959	69	36.	1.6
1960	44	36.	1.4
1962	46	35.	1.1

Willow Leaf Blotch-miner, Lyonetia saliciella Busck

The areas surveyed for this miner in 1960 were sampled again in 1962. Samples of 50 leaves picked at random from willow bushes near the Alaska Highway revealed a declining population at the northern sampling points and an increasing trend to the south. Table 17 shows the figures for 1962 as well as for the last two years that sampling was conducted.

Table 17

Percentage of Willow Leaves Infested by Willow Leaf Blotch-miner, North Prince George District, 1959, 1960, and 1962

Locality	No. points sampled			Percentage leaves infested		
	1959	1960	1962	1959	1960	1962
Liard River	2	2	2	24	0	4
Coal River	4	4	4	21	3	10
Contact Creek	4	5	5	8	24	6
Lower Post	2	5	5	11	25	2

An Ambrosia Beetle in White Spruce, probably *Trypodendron lineatum* (Oliv.)

Decked white spruce logs at a railway landing 10 miles north of Azouzetta Lake were infested with this scolytid on June 6. Entrance holes in the logs, which ranged from one to three feet in diameter, averaged 25 per square foot of wood surface.

Green Spruce Looper, *Semiothisa granitata* complex

As in previous years, this geometrid was common in white spruce and alpine fir collections throughout the District. The highest number of larvae taken in a three-tree beating collection was on August 28 when 19 were obtained from alpine fir. Larvae of the green spruce looper appeared more regularly from white spruce beatings, however, and in a total of 28 three-tree beatings during the larval period 46.4 per cent contained this insect. The average number of larvae per positive collection from white spruce was 2.1.

Green Larch Looper, *Semiothisa sexmaculata* Pack.

The first beating collection containing the larch looper was taken on August 7. Larvae were then present in every three-tree beating collection taken from this date until the termination of the field season. The largest number of larvae collected in one three-tree beating was 45 on September 4.

A Pine Twig Beetle, *Myeloborus* sp.

A low population of this small scolytid was observed between miles 395 and 455, Alaska Highway. At Mile 407 where damage was heaviest, seven per cent of the lodgepole pine twigs were killed on trees over three inches in diameter. Damage was more noticeable on larger trees than on regeneration pine.

A Pitch Nodule Maker, *Petrova* sp.

Pitch nodules were present on 80 per cent of the suppressed, immature lodgepole pine at Mile 2, Cassiar Road. The damage appeared limited to trees within a small area and no mortality at this location was attributed to the insect, although some trees have suffered several attacks in recent years.

Birch Leaf-rollers, *Rheumaptera* spp.

The number of leaf-roller larvae taken in white birch beating collections increased in 1962. The rise in population was particularly noticeable between miles 200 and 300, Alaska Highway. The largest number of larvae of this species taken in one three-tree beating was at Mile 202, Alaska Highway where 43 larvae were collected on August 30.

Swarms of adult Rheumaptera spp. were present along the Alaska Highway between Prophet River and Fort Nelson from mid to late June.

MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
Acleris variana Fern.	Sw	1	Beatton R. Road.
Anoplonyx canadensis Hgtn.	Le	4	northern part of District.
A. luteipes (Cress.)	Le	1	Mile 538 A.H.
A. occidens R. & M.?	Le	1	Mile 342 A. H.
Arge clavicornis (F.)	D, B	3	Mi. 83, 296 A.H. Dease Lk. Road
Choristoneura conflictana (Wlk.)	Cot	1	Hudson Hope Road.
Croesus latitarsus Nort.	A	1	Mi. 242 A.H.
Ectropis crepuscularia Schiff.	D	1	Mi. 83 A.H.
Epirrita autumnata omissa Harr.	D	1	Gold Bar Road
Halisidota maculata Harr.	D	2	fewer than in 1961.
Itame anataria Swett.	D	1	Mile 270 A.H.
I. loricaria julia Hlst.	A	5	common south of Ft. Nelson
Nymphalis antiopa Linn.	W	1	Mi. 588 A.H.
Orgyia antiqua badia Hy. Edw.	Sw, D	2	Mi. 83, 622 A.H.
Pamphiliidae	Sw, Pl, A	5	decrease from 1960
Panthea portlandia group	Pl, Le	3	northern part of District
Schizura unicornis A. & S.	Cot	1	uncommon

Insect	Host	No. of collections	Remarks
Sphinx cerisyi ophthalmicus Grt.	A	3	north of Summit Lake
Zeiraphera diniana Gn.	Le	1	six larvae in one collection
Z. fortunana Kft.	Sw, Le	2	Beatton River Road

DISTRIBUTION OF MISCELLANEOUS ADULT INSECTS, NORTH PRINCE GEORGE DISTRICT

Insect	Host	No. of collections	Remarks
Adalia frigida Schn.	Cot	1	Mi. 410 A.H.
Anoplodera aspera Lec.	Sw	1	Mi. 83 A.H.
Chrysomela falsa Br.	Cot	1	Mi. 10 A.H.
Monochamus notatus Drury	Sw	1	widespread, but only one collected in 1962
Mulsantina picta Rand.	Pl	1	Mi. 393 A.H.
Syneta carinata Mann.	Sw, Pl	3	northern part of District
S. hamata Horn	Sw	1	Progress
S. pilosa Brown	Sw, Pl, Ba, Cot	12	abundant and widespread

STATUS OF FOREST DISEASES

Important Diseases

Climatic Injury to Conifers

Winter drying in the winter of 1961-1962 was very widespread in the North Prince George District. Lodgepole pine was most seriously affected, but where damage was heavy, alpine fir and white spruce usually also exhibited reddish or yellowish discoloration. A total of 19,000 acres of damaged timber was observed in the North Prince George District in 1962. Of this, 17,750 acres in the Pine Pass area consisted of 64 per cent lodgepole pine, 31 per cent combination white spruce and lodgepole pine and five per cent white spruce.

A mortality plot containing 50 lodgepole pine was established at Mount Moray on June 6. The trees in the plot ranged from four to twelve inches d.b.h. and the percentage of foliage damaged ranged from 10 to 100 per cent. When the plot was re-examined on September 5, two of the original 50 trees had failed to put on new foliage. The foliage of both trees had been 100 per cent damaged.

A belt of red-foliaged, regeneration lodgepole pine totalling 2000 acres occurred on the east side of the Trout River between miles 465 and 472, Alaska Highway. A 250 acre area of damaged pine was also visible between miles 420 and 422, Alaska Highway.

Needle Rust on White Spruce

The current year's growth on white spruce at the south end of Dease Lake was infected by this rust when examined on August 11. Evidence of the rust, caused by *Chrysomyxa ledicola* Lagerh. was also noted at Mile 377, Alaska Highway where 70 per cent of the new growth was damaged.

Damage Caused by Varying Hares

Extensive damage was inflicted on regeneration trees and to shrubs by this animal throughout the District in 1962. Lodgepole pine was preferred to other tree species, although damage at many locations was evident on all trees up to four inches in diameter. The larger trees were often girdled to a height of three feet and where this had occurred the hares usually had chewed off the lower branches as well. Reproduction pine up to two inches in diameter was often bitten completely through.

Ink Spot of Aspen

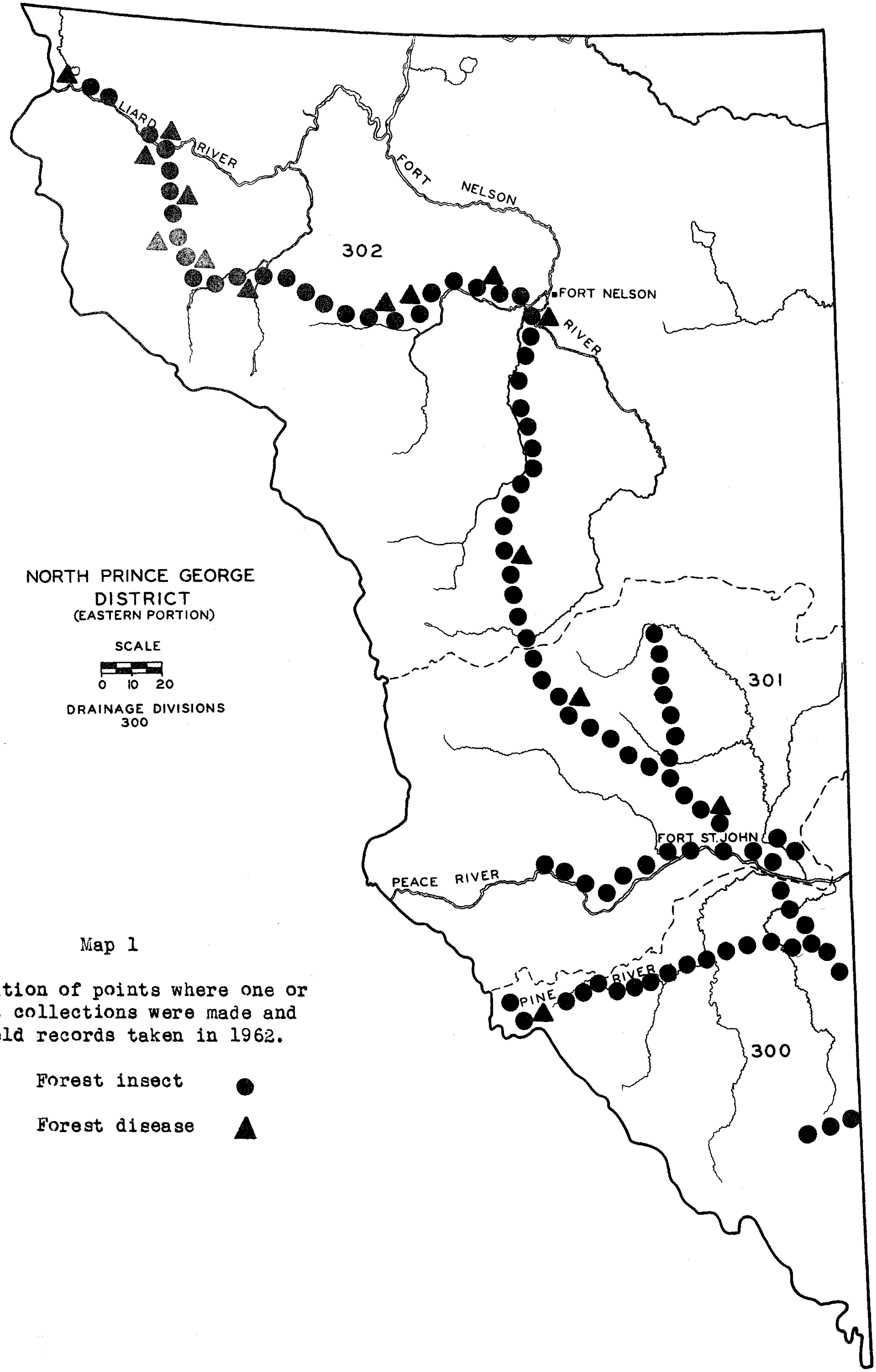
An outbreak of this disease, caused by *Sclerotium* sp., (which may be the imperfect state of *Ciborinia seaveri* Grooves & Bowerm.) extends from Mile 407 to Mile 430 along the Alaska Highway. The percentage of leaves affected in the area ranges from 25 to 100 per cent. Five heavily infected trees at Mile 411 were marked for the collection of overwintered leaves in 1963.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
fir, alpine	*Pucciniastrum epilobii* Otth.	Azouzetta Lk.	Needle rust.
pine, lodgepole	*Coleosporium asterum* (Diet.) Syd.	Mile 69 A.H.	Needle rust.
	Peridermium harknessii J. P. Moore	widespread	Gall rust
willow	*Melampsora epitea* Thüm.	Mi. 233 A.H.	Leaf rust and needle rust of true firs.

Exotic Plantations

The plantation at Groundbirch, established in 1954, was examined on July 21. Few of the Scots pine remain undamaged from road widening and the cutting of survey lines. The 14 which were found, however, appeared free from disease, although three had been heavily browsed.

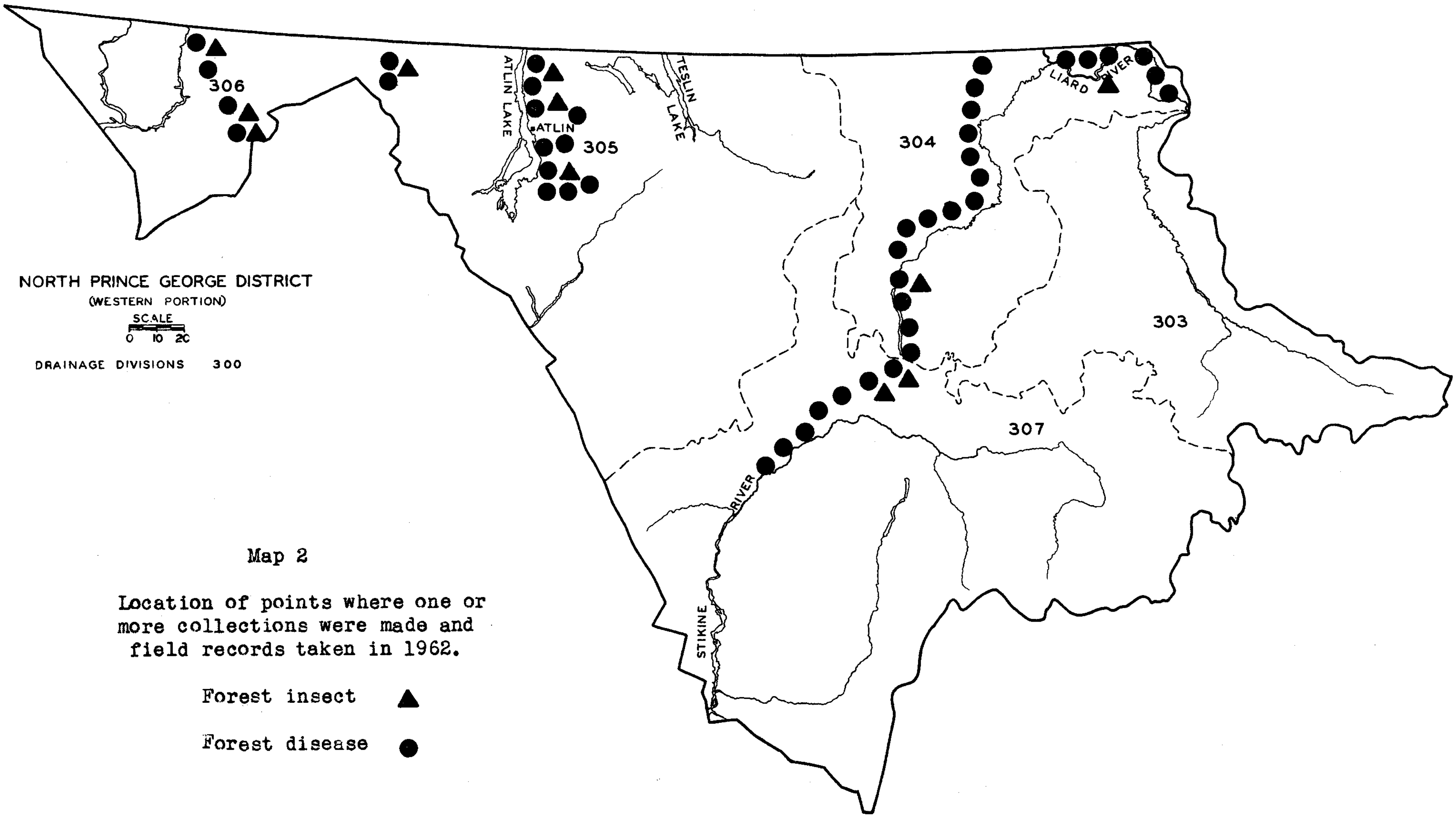


Map 1

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ●

Forest disease ▲

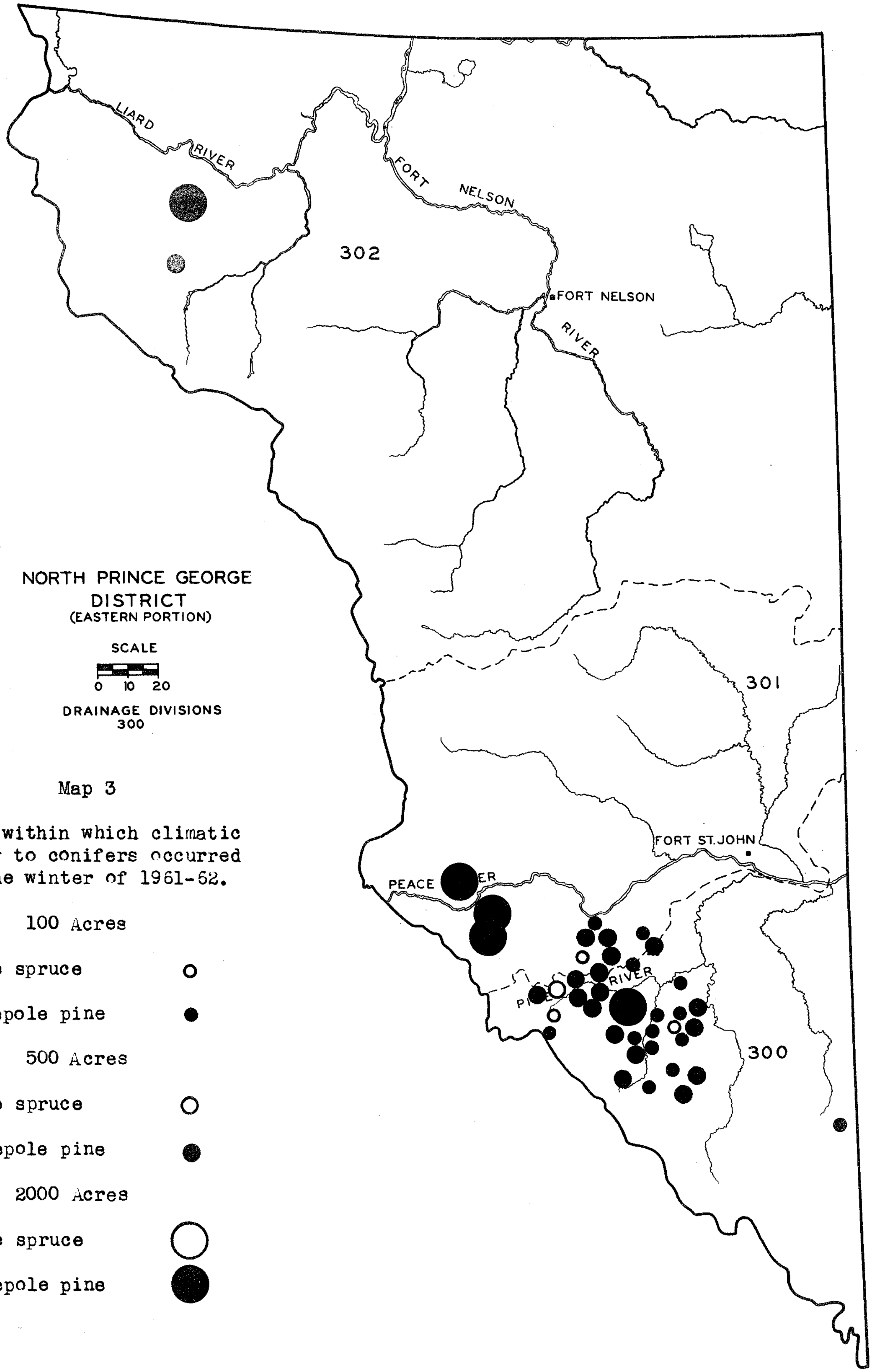


Map 2

Location of points where one or more collections were made and field records taken in 1962.

Forest insect ▲

Forest disease ●



Map 3

Areas within which climatic injury to conifers occurred in the winter of 1961-62.

100 Acres

White spruce

Lodgepole pine

500 Acres

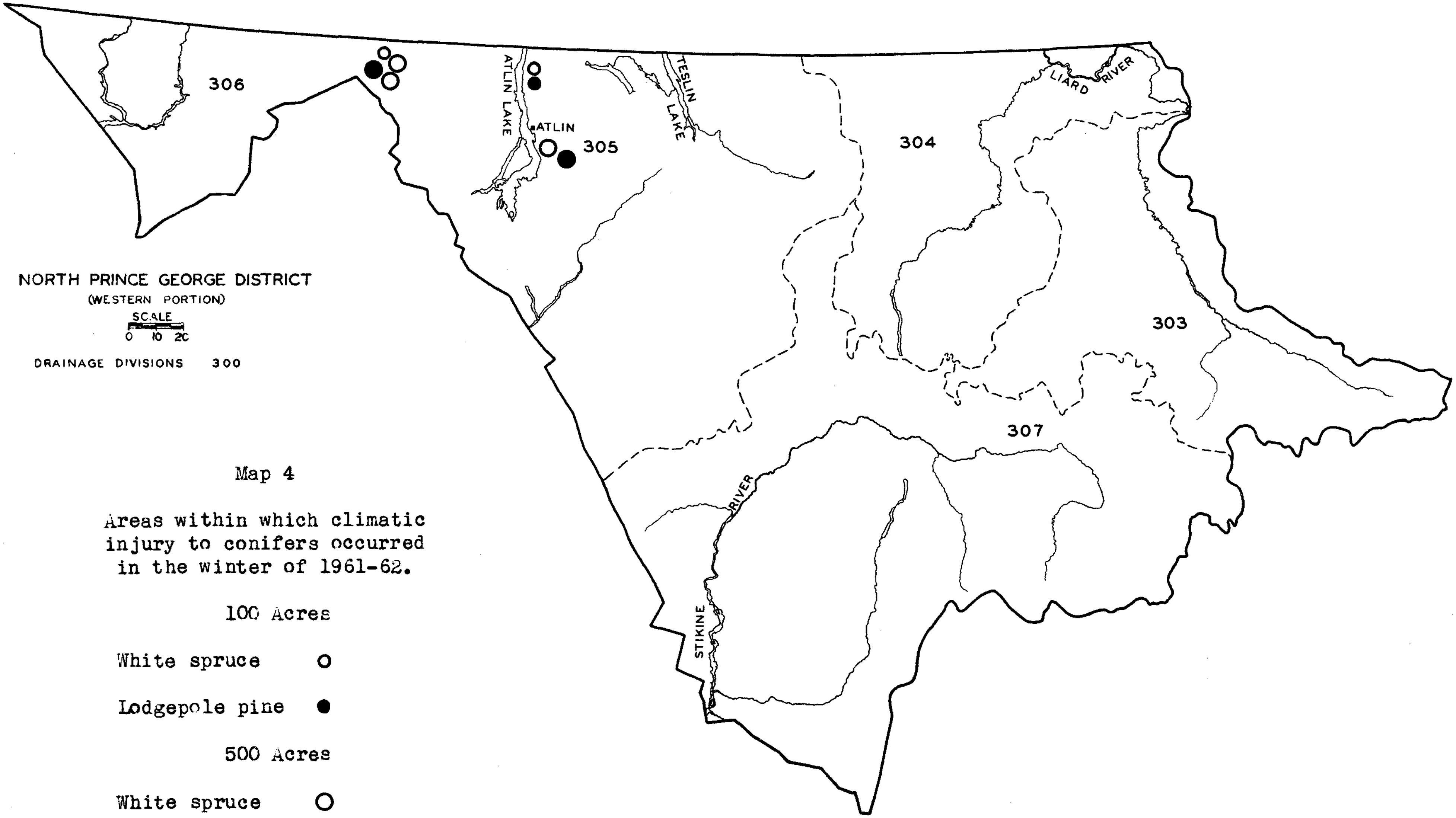
White spruce

Lodgepole pine

2000 Acres

White spruce

Lodgepole pine



Map 4

Areas within which climatic injury to conifers occurred in the winter of 1961-62.

100 Acres

White spruce ○

Lodgepole pine ●

500 Acres

White spruce ○

Lodgepole pine ●

FOREST INSECT AND DISEASE SURVEY

YUKON DISTRICT

1962

FOREST INSECT AND DISEASE SURVEY

YUKON DISTRICT

1962

J. C. Holms

INTRODUCTION

The Forest Insect and Disease Survey in the Yukon Forest Biology Ranger District began on May 26 and terminated on September 7. The areas accessible by roads in Yukon Territory and Atlin Ranger District were surveyed. A flight in a Cessna 180 was made through courtesy of the Yukon Forestry Division. A trip by Yukon Forestry river-boat was taken in mid-July from Whitehorse on the Yukon River to a point 15 miles north of Lake Laberge. In May, a new 32 foot house trailer assigned to the Yukon District was towed from Dawson Creek, B. C. to Riverside Trailer Park, Whitehorse, Y.T.

The Fort McPherson (Aklavik) Road, was completed to Mile 75 at Chapman Lake in 1962. The Ross River Road branching north from Watson Lake Airport Road, was open to Mile 65.

Twenty Forest Insect Survey permanent sampling stations were established during the 1962 field season in the Yukon, bringing the total number of such stations to 40. Table 1 shows the number of insect and forest disease collections by host. Map 1 shows the localities where collections were made and field records taken.

Table 1

Collections by Hosts

Yukon District - 1962

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Fir, alpine	21	9	Alder, mountain	7	3
Hemlock, mountain	6	2	Alder, Sitka	4	2
Hemlock, western	2	-	Alder spp.	2	3
Juniper, common	-	2	Ash, Sitka mountain	5	1
Larch, eastern	7	-	Aspen, trembling	71	82
Pine, lodgepole	37	4	Birch, dwarf	16	7
Spruce, black	25	5	Birch, Kenai	-	1
Spruce, Sitka	5	3	Birch, white	21	16
Spruce, white	176	22	Cottonwood, black	2	-
			Poplar, balsam	18	11
			Poplar spp.	11	4
			Willow spp.	4	11
			Miscellaneous	13	4
			Total	174	145
Total	279	47	Grand total	453	192

STATUS OF INSECTS

Spruce Seedworm, Laspeyresia youngana Kft.

A generally heavy cone crop was present on white spruce in the areas surveyed in the Yukon and north-western B. C. Four samples, each consisting of 80 cones picked at random from four trees, were collected in late July. It was estimated that an average of 30 per cent of the seeds were eaten by the seedworms in the infested cones at the time of examination. There was some evidence of larval parasitism. Table 2 shows the percentage of cones infested in 1959 and 1960 (50 cone samples), and 1961 and 1962 (80 cone samples).

Table 2

Percentage of White Spruce Cones Infested by Spruce Seedworm, Yukon District, 1959-1962

Locality	Percentage infested			
	1959	1960	1961	1962
McKee Creek, B. C.	46	96	97	31
Mile 867 Alaska Highway, Y.T.	26	26	94	72
Mile 976 Alaska Highway, Y.T.	26	60	94	80
Carcross, Y. T.	74	92	89	14

The percentage of cones infested in 1962 was lower than in 1961, probably due to the heavier cone crop.

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

This tortrix caused very light defoliation of trembling aspen at the Carmacks, Y.T., infestation. The area of the infestation decreased since 1961, extending from Mile 104.5 to 106.5 Mayo Road.

As in 1960 and 1961, four feet was cut from the top of each of five trees at Carmacks. The sampled trees averaged two and one-half inches d.b.h. and 26 feet in height. Table 3 shows the results of the examination for defoliation.

Table 3

Defoliation of Trembling Aspen by Large Aspen Tortrix, Carmacks, Y.T. August 1960-1962

Tree number	No. of leaves examined				Percentage of leaves 20-100% devoured		
	1960	1961	1962		1960	1961	1962
1	672	677	1053		44	6	2
2	831	932	1070		69	7	3
3	998	1141	587		36	6	1
4	571	744	520		63	8	5
5	563	1007	748		53	10	4
Total	3635	4501	3978	Av.	33	7	3

No egg masses were found during the examination and only one successfully emerged pupa was seen.

A Gelechiid on Trembling Aspen

No gelechiid larvae were found on the trembling aspen samples taken at the large aspen tortrix infestation north of Carmacks, August 10, 1962.

Spruce Budworm, Choristoneura fumiferana (Clem.)

About 20 spruce budworm pupae were collected in a white spruce beating on July 12 below Sheep Mountain, southwest of Mile 1061, Alaska Highway, Y.T. This insect was lightly defoliating some 500 acres of mature 2-storied white spruce. Twenty vacated spruce budworm pupae were found in a white spruce beating at the same location the last week of August. Two to four per cent of the 1962 tips had been infested. A total of 11 spruce budworm larvae, 21 pupae and 21 empty pupal cases were collected throughout the District from 13 spruce beatings from June to the end of August, 1962. During the same period in 1961, three larvae, three pupae and seven empty pupal cases were collected from seven spruce beatings. White spruce was the major and black spruce the minor host in the areas surveyed.

Two early instar larvae were found on white spruce at Mile 890 Alaska Highway, Y.T. on June 1, 1962. This may indicate that a one-year-cycle occurs in the Yukon, as it is thought that two-year-cycle budworm would have been larger by this date.

Smaller Western Pine Engraver, Ips latidens (Lec.)?

Very little damage caused by the smaller western pine engraver was found in lodgepole pine stands along Annie Lake, McClintock River and Mayo roads in 1962. A number of lodgepole pine trees infested with this species and the lodgepole pine beetle, Dendroctonus murrayanae Hopk. had been felled and used for lumber or firewood along McClintock River and Annie Lake roads.

The population of Ips latidens (Lec.)? is expected to continue at a very low level in 1963.

Lodgepole Pine Beetle, Dendroctonus murrayanae Hopk.

The lodgepole pine beetle was at a low population level and very little new damage to lodgepole pine was found in the areas surveyed in 1962. The lodgepole pine beetle population is expected to continue at a low level in 1963.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The aspen leaf miner population decreased sharply at the Rancheria River (Mile 670, Alaska Highway) and Watson Lake permanent sample plots. A permanent sample plot was established July 13 at Mile 1.1, Snag Road, Y.T. when pupae and larvae were present in small numbers in the leaves. A permanent sample plot was established August 15 at Mile 13, Bonanza Creek Road, Y.T.; a very low population was noted.

The three plots at Watson Lake, Rancheria River and Mile 782 Alaska Highway, Y.T. were sampled the first week of September. The two plots on the Snag and Bonanza Creek roads were sampled the latter part of August. As in the previous three years, samples consisting of two 12-inch branches were cut from each of five tagged trees at each plot and the leaves examined to obtain the data shown in tables 4 and 5.

Table 4

Percentage of Aspen Leaf Surfaces with Mines, and Number of Aspen Leaf Miner Adults Produced per Leaf Surface, 1959-1962, Yukon District

Location	Percentage leaf surfaces with mines				No. of adults produced per leaf surface			
	1959	1960	1961	1962	1959	1960	1961	1962
Watson Lake	54	78	40	10	0.28	0.14	0.09	0.01
Rancheria River	28	42	7	2	0.13	0.06	0.09	0
Mile 782 A.H.	-	-	4	1	-	-	0.04	0
Snag Road	-	-	-	0.5	-	-	-	0
Bonanza Creek Road	-	-	-	0.7	-	-	-	0

Adult emergence indicates that populations may be expected to remain low in 1963.

A 100-cocoon sample was obtained in 1959, 1960 and 1961 at each plot to determine mortality occurring at this stage. In 1962 the aspen leaf miner population was not sufficiently numerous to yield 100 cocoons in any of the plot samples. However, an estimate was based on the cocoons present in each sample and it is hoped that these figures will be comparable to a 100-cocoon sample. Table 5 shows mortality of aspen leaf miners in cocoons in August, 1959, 1960 and late August and September 1961 and 1962.

Table 5

Mortality of Aspen Leaf Miner in 100-cocoon Samples, Yukon District, 1959-1962

Location	Percentage mortality							
	Parasitism				Other causes			
	'59	'60	'61	'62	'59	'60	'61	'62
Watson Lake	25	62	33	45	4	6	9	18
Rancheria River	33	58	12	9	6	8	31	0
Mile 782 Alaska Highway	-	-	30	0	-	-	10	1
Snag Road	-	-	-	28	-	-	-	50
Bonanza Creek Road	-	-	-	25	-	-	-	50

A Birch Leaf Blotch-miner, Gracillaria serotinella Ely

The birch leaf blotch-miner continued to lightly damage white birch throughout the tree's range in the area surveyed in the Yukon District. Small numbers of this insect infested white birch leaves in the Mayo area. The insect had vacated the mines by the latter part of June.

White birch branch-tip samples were taken at two locations on Dawson Road in mid-August, when only vacated leaves were found. Each of the samples consisted of 10 two-foot branch ends cut from the five to 10 foot level of five trees. One branch was cut from the shaded, and one from the exposed side of each of the five trees.

Percentages of white birch leaves infested by Gracillaria serotinella Ely on the Dawson Road, mid-August 1960 to 1962, are shown below. Light damage may be expected to continue in 1963.

Locality	No. of leaves examined			Percentage of leaves infested		
	'60	'61	'62	'60	'61	'62
Mile 45	1003	1012	916	0.1	2.0	2.8
Mile 101	964	1103	717	8.5	6.0	15.5

A Leaf Blotch-miner, *Lithocolletis* sp., on Trembling Aspen

A leaf blotch-miner continued to cause light to medium damage on trembling aspen throughout much of the tree's range in the area surveyed. As in 1960 and 1961 two sites were sampled along the Mayo Road. Each sample consisted of five 12-inch branch tips from five trees. The leaves from each sample were put into a container and 100 leaves were selected at random. The percentages of the two 100-leaf samples infested on the Mayo Road at mid-August were as follows:

Locality	Percentage of leaves infested		
	1960	1961	1962
Mile 215	19.0	9.0	28.0
Mile 168	1.0	43.0	29.0

The infested leaves contained living and dead larvae and unemerged pupae at Mile 168 on August 8, while living and dead larvae were found at Mile 215 on the same day.

Birch Leaf-rollers, *Rheumaptera* spp.

One birch leaf-roller larva, *R. hastata* Linn., was found in a white birch collection at Mile 45, Dawson Road on August 14.

Willow Leaf-miner, *Lyonetia saliciella* Busck

Very light damage caused by the willow leaf-miner was observed in the areas surveyed in the Yukon District in 1962. The McKee Creek, B.C., infestation has died out.

Black-headed Budworm, *Acleris variana* (Fern.)

Black-headed budworm larvae caused light to medium defoliation of the new growth of immature pole-sized alpine fir at Bennett, B. C. These trees are in the lodgepole pine climatic injury area, where alpine fir are few in number. Fourteen larvae and 55 pupae were found in one alpine fir beating on July 27, while 12 larvae and five pupae were taken in another collection on the same site at the end of July. In four other alpine fir beatings in the Bennett area, eight larvae and two pupae were found on July 27. Black-headed budworm larvae were found in small numbers (five larvae in three collections) on white spruce along the Carcross and Tagish roads on July 23. Five larvae were collected from white spruce on July 11 at Mile 1041, Alaska Highway, Y.T., while six larvae were found in a white and a Sitka spruce beating on August 2 on the Haines Road, B. C. Only three larvae were collected from white spruce in 1961 in the Yukon District.

A Lepidopterous Bud Feeder on Spruce, Griselda radicana Wlshm.

About 30 larvae of Griselda radicana Wlshm. were collected in two white spruce beatings below Sheep Mountain, southwest of Mile 1061, Alaska Highway, Y.T. on July 12. This insect was causing light defoliation of new foliage over about 500 acres; the same area was infested by the spruce budworm. The Griselda larvae were feeding in a needle canopy formed by the 1962 needles at the branch tips. Damage believed to have been caused by this species was observed at Mile 143.5, Haines Road, Y.T. where there is a sparse stand of mature and immature white spruce. At this location by August 2, 20 to 50 per cent of the new tips were lightly defoliated in a winter injury area of about five acres.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Yellow-headed spruce sawfly larvae were collected in the Yukon and northwestern B. C. As in previous years the majority of larvae were on white spruce while some were collected from black and Sitka spruce. Larvae were found in beating samples from June 26 to August 30, 1962. The greatest number of larvae taken in any one beating collection was nine, from white spruce at Mile 953 Alaska Highway, Y.T. on August 1. The number of larvae found in three-tree beating collections is shown below.

No. of collections made during larval period			Percentage containing larvae			Av. no. of larvae per positive sample		
1960	1961	1962	1960	1961	1962	1960	1961	1962
38	43	137	40	54	61	1.7	3.2	1.7

Green-headed Spruce Sawfly, Pikonema dimmockii (Cress.)

Larvae of the green-headed spruce sawfly were collected over the same range as the yellow-headed spruce sawfly, from June 26 to August 21, 1962. The majority were from white spruce; a few were found on black and Sitka spruce. The largest number of larvae in any one beating was four, from white spruce at Mile 88, Haines Road, B. C., on August 2, 1962. Comparison of three-tree beating collections containing the green-headed spruce sawfly is shown below.

No. of collections made during larval period			Percentage containing larvae			Av. no. of larvae per positive sample		
1960	1961	1962	1960	1961	1962	1960	1960	1962
38	54	137	16	39	27	1.3	2.1	1.5

A Maggot, Pegohylemyia anthracina Czermy., in White Spruce Cones

This maggot continued to cause varying degrees of damage to white spruce cones in the Yukon and northwestern B.C. areas surveyed. Larvae were present in four 80-cone samples collected at McKee Creek, B. C. and Carcross, Mile 867 and 976 Alaska Highway, Y.T. as noted for studies of Laspeyresia youngana Kft. The degree of infestation for P. anthracina for the four 80-cone samples ranged from 11 per cent at Carcross, Y.T. to 54 per cent at Mile 976 Alaska Highway, Y.T. This percentage range is greater than in 1961 and similar to that noted in 1960.

A Leaf-miner, Phyllocnistis sp. on Black Cottonwood

This insect continued to cause light damage to black cottonwood throughout much of the tree's range in the Yukon areas surveyed.

A Willow Leaf Beetle, Gonioctena notmani Schaeff.

Larvae of this beetle continue to cause light to medium defoliation of willow along Bonanza Creek Road. Late instar larvae were observed in early July when most of the larvae had dropped to the ground to pupate in the soil.

Small numbers of larvae were present on willow leaves at Mile 45, Dawson Road in early July. Defoliation was generally light at that location. A small larval population occurred at Mile 4, Duncan Creek Road north of Mayo, Y. T. in the third week of June. Defoliation was light.

A Trembling Aspen Leaf Beetle, Gonioctena americana Schaeff.

Larvae continued to cause light defoliation to 10 acres of reproduction trembling aspen at Mile 8.4, Fish Lake Road near Whitehorse. Light defoliation of young aspen continued along Bonanza Creek Road and adjacent roads. Twenty adults from a trembling aspen beating were collected on July 6 at Mile 3 Sulphur Creek Road, Y.T.; no larvae were seen.

Oregon Fir Sawyer, Monochamus oregonensis (Lec.)

On June 20, about 50 copulating pairs as well as 25 single males and 25 single female beetles were observed on decked white spruce logs at Ewing's mill-site at Mile 218, Mayo Road, Y.T. The females that were closely attended by males were cutting egg niches and ovipositing while some single females were cutting egg niches. The decks consisted of logs cut during the winters of 1961 and 1962. At the time of observation there was a strong west breeze blowing 10 to 15 miles per hour. M. oregonensis were having difficulty flying into the breeze and travelled by "tacking" or by flying sideways, making little headway. Some beetles, finding the breeze too strong for flight would quickly land on the ground and run to the logs. The temperature was 75 to 80° F. at the time and the beetles were very active. During the last week of June, a few copulating and single adults were observed on the decked logs; the weather was quite cool. One female Oregon fir sawyer was seen on decked white spruce logs on August 10. Two male beetles were seen in flight in early July, and several adults were seen flying during sunny periods in mid-August in the Dawson area. One female was found in a white spruce beating above Keno on August 9.

A Round-headed Borer, *Saperda moesta* Lec.

Two prepupal larvae were collected and left intact in stem galls from regeneration *Populus* sp. (probably balsam poplar) at Mile 12 Carcross Road on June 1. Two adults emerged on June 16 from the galls. Damage was observed in the form of stem galls or swellings on regeneration balsam poplar along Carcross Road and other localities scattered throughout the areas surveyed in the Yukon.

Numerous larvae and prepupae were found in regeneration balsam poplar stems and branches in the Carmacks area the latter part of June. Samples were taken at Mile 1115, 1072 and 1028 Alaska Highway, Y.T. at the end of August. Each sample consisted of 50 regeneration balsam poplar stems selected at random. The stems were cut at ground level to a height of 18 inches above ground. The average diameter of the stems at ground level for the three samples was one-half inch. Examinations showed one small larva in a stem swelling from the Mile 1115 collection; samples from Mile 1072 and 1028 were negative.

A Scolytid, *Cryphalus nitidus* (Sw.), in Willow

This beetle continued to cause some mortality of willow stems in the Dawson area and at other scattered points in the Yukon District.

Alaska Spruce Beetle, *Dendroctonus borealis* Hopk.

No recent attack or mortality of white spruce caused by the Alaska spruce beetle was found in the Yukon District in 1962.

A Scolytid, *Myeloborus* probably *fivazi* Blckm.

Some new damage by *Myeloborus* on lodgepole pine twigs, occurred along McKee Creek Road near Atlin, B. C. and at scattered points throughout the tree's range in the Yukon. Both young and old stands were infested. Paired adults and larvae were found inhabiting common twig galleries early in June, in the Atlin area. The larvae which had hatched in 1961 were extending the galleries along the twigs towards the main branches.

Eastern Larch Beetle, Dendroctonus simplex Lec.

An eastern larch eight inches d.b.h. was felled as a trap tree on May 26 at Mile 681.5, Alaska Highway, Y.T. in a black spruce-eastern larch bog site. By July 19, adults and larvae had become established. The stump was more heavily infested than the bole.

Swallowtail Butterflies, Papilio spp.

Swallowtails were frequently seen in flight, especially along the Mayo Road, and from Whitehorse to Haines Junction, from mid-June into July. One prepupal larva was hand-picked on a Sitka alder leaf near Dawson, Y.T. on August 17 and a second larva, also prepupal, was hand-picked on a trembling aspen leaf by Bonanza Creek Road on August 23. Neither adults nor larvae were seen in 1960 or 1961.

A Sphinx Moth, Smerinthus cerisyi Kby.

Two early instar larvae were collected in mid-July from trembling aspen near Johnson's Crossing and at Mile 898, Alaska Highway, Y.T. Three sphinx moth larvae in two aspen collections were found from August 1 to 10 at Mile 995 Alaska Highway, Minto and Carmacks, Y.T. No larvae were seen in 1961.

Green Spruce Looper, Semiothisa granitata Gn. complex.

Four larvae were collected in four white spruce beatings from August 13 to September 6. Collection locations were Mile 24 Dawson and Mile 9 Dominion Creek roads, Champagne, and Mile 682, Alaska Highway, Y.T. One green spruce looper larva was collected in 1961.

Green Velvet Looper, Epirrita autumnata omissa Harr.

Twenty-four larvae were collected in 10 beatings from July 6 to August 2 at 10 locations in the Yukon and northwestern B. C. Hosts were dwarf birch, white spruce, alpine fir, and Sitka spruce. One larva was collected in 1960 but none was found in 1961.

A Lepidopterous Bud-miner, Argyresthia new sp., on White Spruce

An undescribed species of Argyresthia which mines white spruce buds, continued to cause light damage throughout the range of the host tree in the areas surveyed.

A hand-picked sample containing about 20 living pupae of the bud-miner was taken at Mile 898 on June 1. The adults from the sample emerged on June 14 in the Whitehorse trailer. It is probable that the unusually late spring in 1962 retarded emergence, as this was the first time that living pupae had been collected.

As in 1961, two samples were taken in late July at Mile 898 and Mile 976, Alaska Highway, Y.T. to determine the percentage of infested buds. Each sample consisted of 10, one-foot branch ends from five trees at each site. The results of this examination are as follows:

Locality	No. of tips examined		No. of tips infested		Percentage of tips infested	
	1961	1962	1961	1962	1961	1962
Mile 898	395	363	21	25	5.3	6.9
Mile 976	779	326	94	30	12.0	9.2

OTHER NOTEWORTHY INSECTS

Insect	Host	Collections	Remarks
Acronicta leporina Linn.	A, Biw	3	Mi. 45 Dawson Rd., Bonanza Cr. Rd., Y.T.
A. lepusculina Gn.	A, Biw	2	Bonanza Cr. Rd., Y.T.
Anomogyna mustelina Sm.	Sw	1	rare; Mi. 44 Ft. Mc-Pherson Rd., Y.T.
Anoplonyx canadensis Hgtn.	Le	3	increase over 1961; Mi. 628, 682 A.H., Y.T.
A. luteipes (Cress.)	Le	1	unchanged from 1961; Mi. 682 A.H., Y.T.
Argyresthia sp.	Ba	-	bud miner; not collected in 1962
Compsolechia niveopul-vella Chamb.	Poplar	1	Haines Jct., Y.T.
Dioryctria abietivorella (Grote)	Pl	1	34 of 80 cones infest-ed; Bennett, B. C.
Epinotia solandriana Linn.	Poplar	1	Haines Jct. Y.T.
Gluphisia septentrionis Wlk.	A	3	Mi. 1 Atlin Rd., Mi. 26 Mayo Rd., Mi. 45 Dawson Rd., Y.T.

Insect	Host	Collections	Remarks
Ichthyura brucei Hy. Edw.	A	1	Mi. 24, Atlin Rd., Y.T.
Lycia rachelae Hlst.	Big	1	rare; Mi. 745 A.H., B.C.
Neodiprion spp.	H, S	5	first week of Aug; Mi. 42, 46, 49 Haines Rd.
Notodonta simplaria Graef.	A	2	quite rare; Mi. 826 A.H., Carmacks, Y.T.
Nyctobia limitaria Wlk.	Sw	1	rare; Mi. 15 Dawson Rd., Y.T.
Nymphalis antiopa Linn.	Bpo	1	about 75 larvae in one colony on a young tree; Mi. 2 Dawson Rd., Y.T.
Operophtera bruceata Hlst.	A, Big	2	unchanged from 1960 and '61. Mi. 24 Mayo Rd., Mile 1029 A.H., Y.T.
O. occidentalis Hlst.	A, Biw, Ds	3	quite rare; Bennett, B.C., Mi. 24 Mayo Rd., Hunker Cr. Rd., Y.T.
Parorgyia grisefacta Dyar	Sw	1	rare; Mi. 15 Dawson Rd., Y.T.
Pheosia rimosa Pack.	A	1	quite rare; Mi. 45 Dawson Rd., Y.T.
Pissodes terminalis Hopk.?	Pl	3	low population in terminals; Atlin, B.C., Annie L. Rd., Mi. 2 Mayo Rd., Y.T.
Rheumaptera albodecorata Blkmre.	Blueberry	1	rare; Mi. 42 Haines Rd., B. C.
Semiothisa sexmaculata Pack.	Le	3	slight increase over 1961
Syngrapha epigaea Grt.	Big	1	rare; Mi. 53 Dawson Rd., Y.T.
S. selecta Wlk.	Sw	6	quite common; Mi. 867 A.H., Whitehorse, Mi. 85, 130, 225 Mayo Rd., Y.T.

Insect	Host	Collections	Remarks
Zeiraphera diniana Gn.	Le	1	rare; Mi. 682 A.H.,Y.T.
Z. fortuana Kft.	Sw	2	rare; Mi. 157 Mayo Rd., Mi. 1080 A.H., Y.T.

MISCELLANEOUS INSECT ADULTS

Insect	Host	Collections	Remarks
Buprestis nuttalli Kby.	Sw	1	Mi. 15 Dawson Rd., Y.T.
Dicerca probably prolongata Lec.	A, Bpo, in flight	7	quite common in areas surveyed
Gonocallus collaris Kby.	A	3	quite rare; Mi. 898, 1006 A.H., Mi. 71 Mayo Rd., Y.T.
Hylobius pinicola (Couper)	Sw	2	quite rare; Mi. 40 Canol Rd., Mi. 2 Dawson Rd., Y.T.
Phratora purpurea purpurea Br.	A	1	Mayo, Y.T.
P. hudsonica Br.	Biw	1	Snag Rd., Y.T.
Phymatodes dimidiatus Kby.	in flight	1	Mayo, Y.T.
Pityophthorus probably tuberculatus Eich.	Pl	1	fairly common at Whitehorse
Sirex cyaneus F.	Sw	1	a rare horntail; Mi. 992 A.H., Y.T.
Trypodendron retusum Lec.?	A	1	in recently dead tree; Mi. 8 Mayo Rd., Y.T.
Urocerus flavicornis (F.)	in flight	6	found throughout district
Xylotrechus undulatus Say	Sw	2	fairly common in areas surveyed
Zeugophora sp.	A	1	quite rare leaf beetle; Dawson, Y.T.

STATUS OF FOREST DISEASES

Important Diseases

Blister Rust on Lodgepole Pine

Cronartium comandrae Peck infections continued to cause light mortality in regeneration lodgepole pine stands at scattered points in the Yukon.

Needle Rust on White and Black Spruce

This "witches-broom" rust caused by Chrysomyxa arctostaphyli Diet. continued to inflict light damage on white and black spruce in the Yukon and northwestern portions of British Columbia.

A Willow Leaf Rust

A willow leaf rust caused by Melampsora epitea Thüm. occurred throughout the Yukon District areas surveyed. This rust became noticeable earlier in 1961 when damage was more severe than in 1962. The later appearance of the rust in 1962 could have been due to the unusually late spring in the Yukon and northern portions of B. C.

Melampsora Rust of Trembling Aspen.

A specific survey (see Foreword) was made to determine the extent and severity of the trembling aspen leaf rust uredinial stage caused by Melampsora albertensis Arth. in the Yukon District, 1962. The coniferous host of M. albertensis is Douglas-fir which has a range ending about 350 miles south of the Yukon. Eastern larch, which is the coniferous host of M. medusae Thüm. occurs in the south-eastern portion of the Yukon. The two rusts can not be separated on trembling aspen, the alternate, deciduous host of the two rusts, which occurs throughout much of the Yukon area surveyed.

A total of 61 aspen leaf samples were taken from August 8 to September 6 along the Alaska Highway and adjacent roads in the district; 27 of the samples were negative, 28 were classed as light infection, while three were medium and three were heavy. The three heavily infected samples occurred at Watson Lake, Mile 153 Mayo Road and Mile 1149 Alaska Highway, Y.T. The Watson Lake sample was in close proximity to eastern larch and it is possible that M. medusae occurs in that area.

Climatic Injury to Lodgepole Pine

An increase of about 100 acres of winter-damaged immature lodgepole pine was noted beyond the southeastern portion of the area surveyed in

1960 and 1961 at Bennett, B. C. Very little change in appearance was seen in the original area of damaged lodgepole pines, except for reddening foliage on a few branches near the bases of some of the affected trees. The extent of the damaged pine now exceeds 480 acres.

? Climatic Injury to Alpine Fir

Mortality of alpine fir tips at Calumet, in the Keno Hill area, on Clear Creek and Canol roads, Y.T., and near Bennett, B. C., continued in 1962 but to a lesser degree than in 1960 and 1961.

As in 1960 and 1961, two samples, each consisting of ten 12-inch branch ends from five trees were taken at Calumet and on Clear Creek Road to determine twig tip mortality. The average d.b.h. of the trees sampled was four inches; branch samples were cut from the five to 10 foot level. Percentage of alpine fir twig tip mortality caused by what is presumed to be climatic injury was as follows:

Locality	No. of tips examined			Percentage of dead tips		
	1960	1961	1962	1960	1961	1962
Calumet	356	230	290	45.2	43.9	19.3
Mile 9 Clear Creek Road	367	332	334	42.5	21.4	7.5

Winter Drying of White Spruce and Lodgepole Pine

Winter injury in the form of winter drying of white spruce and lodgepole pine was widespread in the Yukon District during the 1962 field season. The winter of 1961-62 was more severe and prolonged than usual and these factors coupled with a sudden warming trend after a severe cold spell apparently caused the reddened foliage to appear in varying degrees at scattered exposed sites in the Yukon and portions of northwestern British Columbia. The damage occurred from 2200 to 3000 feet elevation, mostly on or adjacent to valley bottoms running north and south, while some injury occurred on slopes with a westerly exposure, some in a valley bottom running east and west and the remainder on a northwest slope. Generally, affected trees were not in a continuous band but occurred in areas ranging from about five acres to 200 acres. Winter drying was not seen in the Yukon in 1960 or 1961. Table 6 shows localities, areas and intensity of damage occurring on white spruce.

Winter injury or winter drying in the form of reddened foliage on lodgepole pine occurred as shown in Table 7.

Table 6

Incidence of White Spruce Winter Drying in the Yukon, 1962

Locality	Area (acres)	Damage
Mile 11-27 Carcross Road, Y.T.	400	light to heavy
Carcross, Y.T. to Bennett, B. C., via W.P.-Y.R.	1100	light to medium
Mile 32 Atlin Road, B. C.	20	light to medium
McKee Creek Road, B. C.	500	light to medium
Mile 115-156 Haines Road, Y.T.	1500	light to heavy
Kusawa Lake, Y.T.	500	light to medium
Mile 1079, Alaska Highway, Y.T.	20	light to medium
Mile 1083, Alaska Highway Y.T.	200	light to medium
Total	4200	

Table 7

Incidence of Lodgepole Pine Winter Drying in the Yukon, 1962

Locality	Area (acres)	Damage
Mile 893 Alaska Highway, Y.T.	60	light
Mile 2-32 Atlin Road, Y.T. and B.C.	90	light to medium
Carcross, Y.T. to Bennett, B. C., via W.P.-Y.R.	300	light to medium
McKee Creek Road, B. C.	500	light to heavy
Mile 107 Mayo Road, Y.T.	20	light to medium
Mile 718 Alaska Highway, Y.T.	50	medium
Little Salmon and Yukon rivers junction	30	light to medium
Total	1050	

Combined total areas of white spruce and lodgepole pine injury was about 5250 acres.

Four plots were established in 1962 in an attempt to determine tree survival in winter injury areas. White spruce plots were established at Mile 19.3, Carcross Road, Y.T., where five trees of various ages and severity of injury were tagged, and at Mile 145.8, Haines Road, Y.T., where four trees were tagged. Lodgepole pine plots were established at Mile 32.1, Atlin Road, B. C., where two severely injured trees were tagged, and at Mile 106.8, Mayo Road, Y.T. where two trees were marked. These trees will be re-examined in 1963.

Map 2 shows areas within which climatic injury to conifers occurred in the winter of 1961-62 in the Yukon. Map 4 in the report for the North Prince George District, shows winter injury areas of white spruce and lodgepole pine in the northwestern portions of B. C. near Bennett and Atlin.

Brown Leaf Blotch on Trembling Aspen

A brown leaf blotch probably caused by Marssonina brunea (Ellis & Everh.) Sac. on trembling aspen was first noticed at Mile 13, Aishihik Road, Y.T., on August 1. All the leaves of affected trees had brown splotches on the upper and lower surfaces. Aspen with brown leaf blotch became most noticeable towards the end of August through much of the tree's range. Table 8 shows localities, areas and intensity of damage to aspen.

Table 8

Brown Leaf Blotch of Trembling Aspen in the Yukon, 1962

Locality	Area (acres)	Damage
Mile 13 Aishihik Road	5	light to medium
Bonanza Creek Road	30	light to heavy
Mile 6-17 Hunker Creek Road	10	light to medium
Mile 15-20 Sulphur Creek Road	11	light to medium
Mile 6-17 Dominion Creek Road	24	light to medium
North of Mile 102 Dawson Road	20	light to medium
Mile 4 Fort McPherson Road	1	light to medium
Mile 953 and 799 Alaska Highway	1	light to heavy
Beaver Creek, P.O.	10	light to medium
Total	112	

All of the affected patches had sharply defined boundaries with surrounding aspen trees not injured. All of the foliage discoloration seen occurred on immature trees. Such damage was not found in 1960 or 1961.

Clumping of Trembling Aspen and Poplar Foliage

Frequent observations in 1962 showed a definite clumping of leaves toward the branch ends of young trembling aspen, black cottonwood and balsam poplar growing on comparatively exposed sites. This condition may have been caused by late frost or other climatic injury prior to the buds' opening. At two or three localities this poplar foliage condition occurred adjacent to white spruce and lodgepole pine stands which had sustained winter injury, indicating that the poplar damage probably resulted from similar conditions. The poplar bud damage occurred from Carcross, Y.T. to Bennett, B. C. along the Haines Road, at Mile 1128, Alaska Highway, in the Atlin, B. C. area, and along the Mayo Road on the more exposed sites.

Damage Caused by Varying Hares.

Varying hare damage to regeneration lodgepole pine, white spruce, poplars and willow was more extensive during the winter of 1961-62 than the previous winter. Damage was especially noticeable along the Alaska Highway from Watson Lake to Whitehorse with heaviest damage occurring from Mile 800 to 870. In some areas along the highway in the Yukon, trees 10 feet in height and less were girdled on the lower stem, while other trees had only stem and branch stubs remaining. In regeneration lodgepole pine stands along Atlin Road, damage was very extensive at one or two spots.

It is thought that the varying hare population in the Yukon and northern B. C. will decline during the winter of 1962-63 due to disease. Small numbers of dead, apparently diseased, rabbits were found during the field season.

OTHER NOTEWORTHY DISEASES

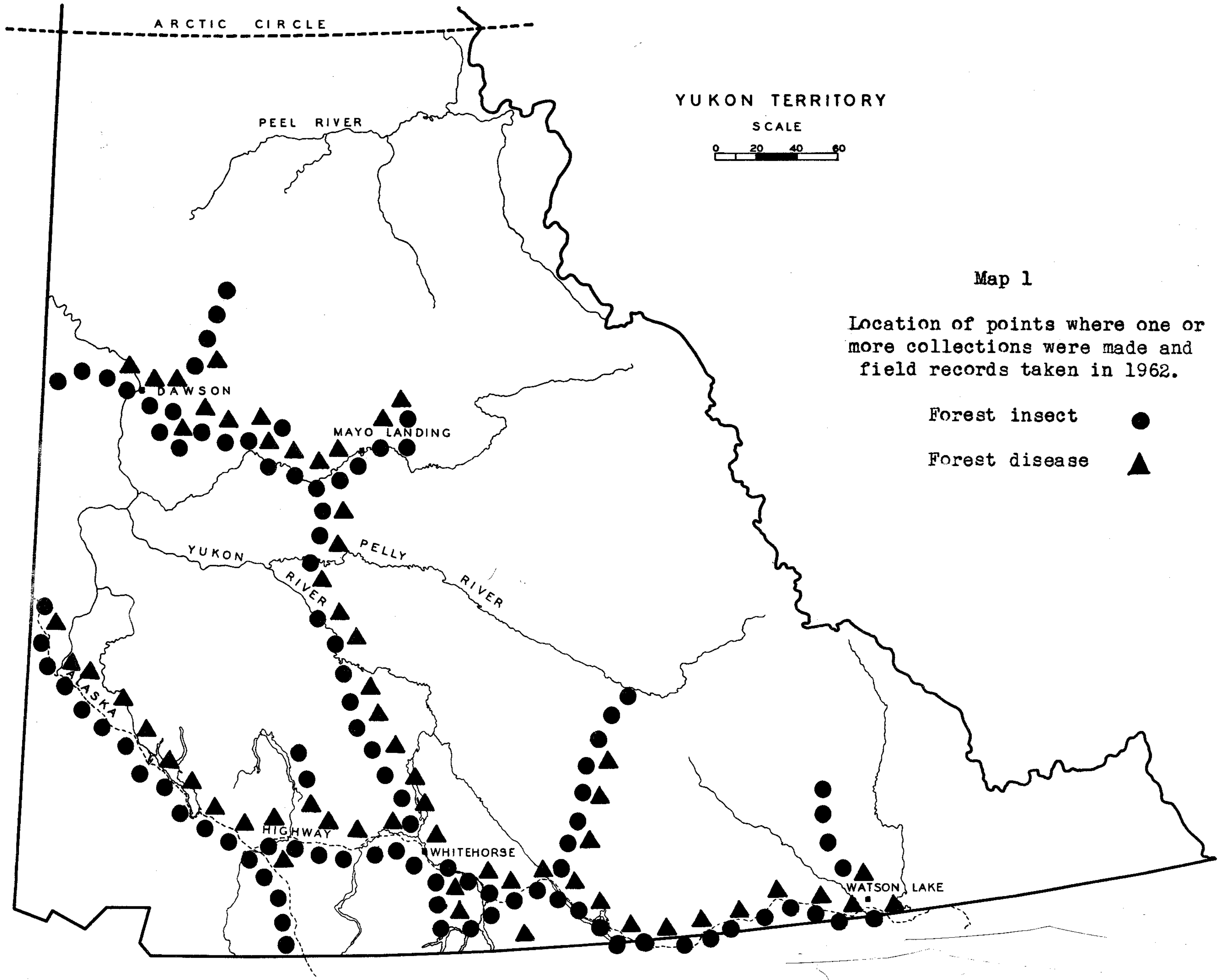
1962

Host	Organism	Locality	Remarks
Alder	Cyphella fasciculata (Schw.) Berk. & Curt.	Watson L., Y. T.	New record for Y.T.; saprophyte.
	Polyporus ?elegans Bull. ex Fr.	Bennett, B. C.	Causes rot.
Alder, Sitka	Pleurotus atrocaeruleus (Fr.) Quel.	Dawson, Y.T.	New record; saprophyte.
Alder, mountain	Fomes igniarius (L. ex Fr.) Kickx	Bonanza Cr. Rd., Y.T.	New host record; causes white trunk rot of heart-wood of hardwoods.
Aspen, trembling	Cenangium pruinosum (Ellis & Everh.) Seaver	Mi. 24 Dawson Rd., Y.T.	New record; considered to be a saprophyte on dead branches.
	Polyporus pargamenus Fr.	Mi. 170 Mayo Rd., Mi. 24, 36 Dawson Rd., Y.T.	Causes white pocket rot of dead sapwood of hardwoods.

Host	Organism	Locality	Remarks
	? Pseudomonas syringae van Hall	Mi. 107 Mayo Rd., Y.T.	Dead buds and sparse foliage present on affected trees may have been due to bacterium causing "crown" gall on root crown or root collar.
	Stereum rufum (Fr.) Fr.	Mayo, Y.T.	New record for Y.T.; probably decay fungus.
	Valsa sp.	Mayo, Y.T.	New host record; can cause stem canker of weakened trees.
Birch, Alaska white	Melampsoridium betulinum (Fr.) Kleb.	Bonanza Cr. Rd., Mile 12 Ft. Mc-Pherson Rd., Y.T.	New host record for Y.T.; causes a leaf rust
Birch, dwarf	Melampsoridium betulinum (Fr.) Kleb.	Keno Hill, Clear Cr. Rd., Mi. 24 Ft. McPherson Rd., Y.T.	Causes leaf rust.
Birch, Kenai	Melampsoridium betulinum (Fr.) Kleb.	Clear Cr. Rd., Y.T.	New host record for Y.T.; causes a leaf rust.
Birch, white	Fomes fomentarius (L. ex Fr.) Kickx	Duncan Cr. Rd., Y.T.	Causes a white mottled rot of hardwoods.
	Fomes igniarius (L. ex Fr.) Kickx	Duncan Cr. Rd., Mi. 6 Ft. McPher-son Rd., Y.T.	Causes white trunk rot of heartwood of hard-woods.
	Melampsoridium betulinum (Fr.) Kleb.	White R., P.O., Y.T.	Causes a leaf rust.
	Pleurotus sapidus Kalchbr.	Clear Cr. Rd., Y.T.	New host record; saprophyte
Cinquefoil, shrubby	Phragmidium ander-sonii Shear.	Mi. 992 A.H., Y.T.	New record for Y.T.; appeared as "chocolate pimples" on leaves; causes a leaf rust.
Fir, alpine	Peridermium holwayi Syd.	Keno Hill, Y.T. Mi. 8 Ruffner Mine Rd., Bennett, B.C.	Causes a needle rust.

Host	Organism	Locality	Remarks
Fireweed	Pucciniastrum epilobii Otth.	Bonanza Cr. Rd., Y.T.	Causes a needle rust on alpine fir.
Hemlock, western	Fomes pini (Thore ex Fr.) Karst.	Mi. 49 Haines Rd., B. C.	A wood-destroying stem fungus of living trees causing a white pocket rot.
	? Phacidium infestans Karst.	Mi. 50 Haines Rd., B. C.	Causes a snow blight.
Juniper, common	Lophodermium juniperinum (Fr.) de Not.	Mi. 32 Atlin Rd., Mi. 54 Haines Rd., B. C.	Appeared as black spots on needles; saprophytic.
Poplar	Stereum rufum (Fr.) Fr.	Haines Jct. Y.T.	New record for Y.T.; probably decay fungus.
Poplar, balsam	Ganoderma applanatum (Pers. ex Wallr.) Pat	Rock Cr. Rd., Beaver Cr., P.O. Y.T.	Causes white rot of usually dead hardwoods.
	?Pseudomonas syringae van Hall	Mi. 107 Mayo Rd., Y.T.	Dead buds and sparse foliage present on affected trees may have been due to bacterium causing "crown" gall on root crown.
Rose, wild	Phragmidium fusiforme Schroet.	Mi. 24 Ft. McPherson Rd., Y.T.	Causes a leaf rust.
Spruce, black	Chrysomyxa woronini Tranz.	Duncan Cr. Rd., Mi. 4 Ft. McPherson Rd., Dawson, Y.T.	Causes a branch tip needle rust.
	Fomes pini (Thore ex Fr.) Karst.	Mi. 1179 A.H., Y.T.	New host record; a wood-destroying fungus of living trees causing a white pocket trunk rot.
Spruce, Sitka	Fomes pinicola (Swartz ex Fr.) Cooke	Mi. 50 Haines Rd., B.C., Mi. 1171 A.H., Y.T.	Causes a brown cubical rot of heartwood and sapwood of dead trees.
	? Herpotrichia nigra Hartig	Mi. 54 Haines Rd., B. C.	Causes a brown felt blight.

Host	Organism	Locality	Remarks
	Polyporus schweinitzii Fr.	Mi. 49 Haines Rd., B. C.	Causes a brown cubical rot of the heartwood of living trees.
Spruce, white	Chrysomyxa ledi de Bary	"	Causes a needle rust.
	Chrysomyxa ledicola Lagerh. Otth.	widespread	Causing generally light damage except at Keno Hill, Y.T. where damage was heavy; causes a spruce needle rust.
	Chrysomyxa pirolata Wint.	Mi. 976 A.H. Y.T.	New record for Y.T.; causes a cone rust of spruces.
	Chrysomyxa woroninini Tranz.	Duncan Cr. Rd., Y.T.	Causes a branch tip needle rust.
	Fomes pinicola (Swartz ex Fr.) Cooke	Mi. 36 Dawson Rd., Beaver Cr., P.O. Calumet, Y.T.	Causes brown cubical rot of heartwood and sapwood of dead trees.
	Lenzites saepiaria (Wulf. ex Fr.) Fr.	Mi. 36 Dawson Rd., Mi. 9 Ft. McPherson Rd., Mi. 1171 A.H., Y.T.	Causes a brown pocket rot of dead coniferous sapwood
	Polyporus volvatus Pk.	Mi. 9 Ft. McPherson Rd., Y.T.	Causes a greyish rot of dead sapwood.
	? Pucciniastrum sparsum (Wint.) E. Fischer	Mi. 1080 A.H., Y.T.	May be a new host record as well as a new record on spruce for North America; causes a needle rust.
Willow	Melampsora "deformans" Leppik	Mi. 157 Mayo Rd., Y.T.	Causes a witches' broom.
	Polyporus ? elegans Bull. ex Fr.	Duncan Cr. Rd., Y.T.	Decay fungus.
Willow	?Cenangium betulinum Peck	Dawson, Y.T.	New record; saprophyte.


ARCTIC CIRCLE
YUKON TERRITORY
SCALE
0 20 40 60
PEEL RIVER
Map 1
Location of points where one or more collections were made and field records taken in 1962.
Forest insect
Forest disease
DAWSON
MAYO LANDING
YUKON
PELLY
RIVER
RIVER
ALASKA
HIGHWAY
WHITEHORSE
WATSON LAKE